AMENDMENT TO THE RECORD OF DECISION

CHEMPLEX SUPERFUND SITE

OPERABLE UNIT NO. 1 – GROUNDWATER

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U.S. ENVIRONMENTAL PROTECTION AGENCY
REGION 7
11201 Renner Boulevard
Lenexa, Kansas

AMENDMENT TO THE RECORD OF DECISION

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1. DECLARATION

1.1 Site Name and Location

The Chemplex Superfund Site (Site) is a non-National Priorities List[1] (NPL) site located in Clinton County, Iowa in portions of Sections 19, 20, 29 and 30 within Township 81 North, Range 6 East. The Site, encompassing approximately 700 acres, is located 1.5 miles northwest of the center of the city of Camanche and five miles west of the city of Clinton's downtown, between U.S. Highway 30 and 21st Street (Figure 1). The Site is located within the city limits of Clinton and Camanche.

1.2 Statement of Basis and Purpose

Section 117 of the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA), 42 U.S.C. § 9617, provides public participation requirements for remedy selection and for changes to a remedy after the issuance of a Record of Decision (ROD). This Amendment to Record of Decision (ROD Amendment) presents changes to the remedy selected in the ROD for Operable Unit number 1 (OU1) for the Site issued by the U.S. Environmental Protection Agency on September 27, 1989, (the "OU1 ROD"). This ROD Amendment is issued in accordance with CERCLA and Sections 300.430(f)(3) and 300.435(c)(2)(ii) of the National Oil and Hazardous Substances Pollution Contingency Plan (the "NCP"), which specifies the public participation requirements for remedy selection and for revising a remedy previously selected by the EPA.

1.3 Assessment of Site

The Chemplex groundwater extraction and treatment system was constructed in 1994 as part of the Site remedy selected in the OU1 ROD. Although this system has removed significant volatile organic compound (VOC) mass from Site groundwater, monitoring data indicate that the extraction system has been ineffective in capturing portions of the contaminated groundwater due to extensive fracturing of the dolomite bedrock underlying the Site. Furthermore, based on groundwater monitoring results, the effectiveness of hydraulic capture cannot be significantly improved by adding extraction wells due to technical limitations associated with uncertainties in locating the bedrock fractures in the aquifer. Recent monitoring data indicate that the groundwater cleanup levels set forth in the OU1 ROD cannot be achieved using the extraction and treatment remedy selected in the OU1 ROD.

Pilot testing of the revised remedy, which includes treatment of VOC "hot spots" and institutional controls to reduce the risk of exposure to impacted groundwater, has shown that this revised approach will be protective of human health and the environment. Section 3 of this ROD Amendment discusses this in more detail.

1.4 Description of the Revised Remedy

This ROD Amendment applies to OU1 which addresses contaminated groundwater at the Site. In the OU1 ROD, the EPA selected groundwater extraction and treatment as the remedy to address contaminated groundwater. This ROD Amendment revises that remedy by selecting an enhanced exposure control remedy which includes the following components: (1) expanded groundwater and

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[1] The National Priorities List, or NPL, is a list compiled by the EPA pursuant to Section 105 of CERCLA, 42 U.S.C. § 9605, of uncontrolled hazardous substance releases in the United States that are priorities for long-term remedial evaluation and response.

surface water monitoring; (2) permanent shutdown of the groundwater extraction and treatment system; (3) establishment of a technical impracticability (TI) zone; (4) performance of in situ hot spot treatment; (5) extension of the city of Camanche municipal water supply system; and (6) institutional controls. For reasons described below, this enhanced exposure control remedy will replace the groundwater extraction, pretreatment, treatment, and discharge components of the remedy as selected in the OU1 ROD.

The EPA is the lead regulatory agency for this ROD Amendment, and the Iowa Department of Natural Resources (IDNR) is the support agency.

1.5 Statutory Determinations

The selected remedy is consistent with CERCLA and the NCP. The selected remedy is protective of human health and the environment, complies with federal and state requirements that are applicable or relevant and appropriate to the remedial action (except as waived), and are cost effective. Treatment of contaminant sources has occurred at the Site, both through landfill gas extraction (LGE) and groundwater extraction and treatment. In addition, hot spot treatment is a component of the revised remedy. Accordingly, the CERCLA preference for treatment has been, and will be, satisfied. However, the EPA recognizes that further treatment has limited applicability at the Site since it is technically impracticable from an engineering perspective to effectively treat groundwater in the bedrock.

Because the selected remedy will result in hazardous substances, pollutants, or contaminants remaining on-Site above levels that allow for unlimited use and unrestricted exposure, the EPA will continue to review the remedy no less often than every five years to ensure that the remedy is or will be protective of human health and the environment.

1.6 ROD Data Certification Checklist

The following information is included, as indicated, in this ROD Amendment. Additional information can be found in the Administrative Record file for the Site, OU1.

- Contaminants of Concern (COCs) and their respective concentrations – Section 2.3 and Appendix B.
- Baseline risk presented by the COCs – Section 4.5.
- How source materials constituting principal threats are addressed – Section 7.6.
- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater in the baseline risk assessment and ROD – Sections 2.1 and 4.
- Potential land and groundwater use that will be available at the Site as a result of the selected remedy – Section 4.

- Estimated capital, annual operation and maintenance, total present worth costs, discount rate and the number of years over which the remedy cost estimates are projected – Section 5.7.

- Key factor(s) that led to the selected remedy – Section 3.

1.7 Authorizing Signature

Cecilia Tapia, Director
Superfund Division

12/26/12
Date

2. DECISION SUMMARY

2.1 Site Description and Site Geology

The Site is located in a predominantly semi-rural area, with agricultural fields, scattered residences and some industries. A polyethylene manufacturing plant that occupies a portion of the Site is currently operated by Equistar Chemicals (Equistar), a subsidiary of LyondellBasell Industries (Lyondell). A former fertilizer manufacturing plant, previously known as Hawkeye Chemical, Arcadian Fertilizers and PCS Nitrogen Fertilizer (PCS Nitrogen) and which is now owned by Cross Roads Land Development Corporation, is located southeast of the Site. The Todtz Superfund Site (IAD000606038) is located about one mile to the south of the Site (Figure 1).

Two streams, the Eastern and Western Un-named Tributaries, flow near the eastern and western boundaries of the Site. These two streams flow south, draining into Rock Creek. Rock Creek flows primarily west to east near the southern boundary of the former PCS Nitrogen property. About one-and-one-half miles southeast of the Site, Rock Creek flows adjacent to a series of lakes that, in part, are the result of past quarrying operations. Rock Creek and the lakes eventually discharge to the Mississippi River, located about two miles south of the Site.

A schematic illustration of the Site soil and bedrock layers, or "stratigraphy," is presented on Figure 2. The stratigraphic layers at the Site, from the ground surface downward, consist of: (1) an alluvial, unconsolidated soil overburden; (2) several fractured Silurian-era dolomite layers, consisting of the Upper Scotch Grove, Lower Scotch Grove, Picture Rock, Farmers Creek, Lower Hopkinton and Blanding layers; and (3) the Ordovician-era Maquoketa Shale layer.

The massive, dense shale of the Maquoketa Formation has extremely low permeability and serves as an "aquiclude" that blocks downward groundwater flow. The Picture Rock layer, which has a lower permeability than the overlying and underlying bedrock layers, restricts groundwater flow but does not block the flow completely.

2.2 Site History

The polyethylene plant began operating at the Site under the Chemplex name in 1968, manufacturing both low-density polyethylene (LDPE) and high-density polyethylene (HDPE). The plant includes several ethylene production areas, water and wastewater treatment plants, a landfill now called the "Chemplex Landfill," and several other chemical and product storage tanks and loading areas.

A byproduct of the polyethylene manufacturing process is debutanized aromatic concentrate (DAC), a liquid that is approximately 40 to 50 percent benzene. This byproduct is stored in above-ground tanks inside the plant before shipment via railroad car or tanker truck.

The West Region of the Site includes the seven acre Chemplex Landfill that was used for the disposal of various materials, including demolition debris and water treatment sludges. From about 1968 to 1978, tetrachloroethene, also known as tetrachloroethylene, perchloroethylene, or PCE, was used periodically at the plant to clean clogged process piping. Spent PCE was also reportedly disposed of within the Chemplex Landfill.

American Chemical Company and Getty Chemical Company (ACC/GCC) operated the Chemplex facility from 1968 through 1984, after which it was sold to a series of different entities. The polyethylene facilities are currently operated by Equistar. ACC/GCC owns the land occupied by the landfill, as well as other properties to the southwest.

2.3 Nature and Extent of Site Contamination

PCE is the primary contaminant of concern (COC) at the Site. The other key COCs in Site groundwater are benzene and polynuclear aromatic hydrocarbons (PAHs). Although the Chemplex Landfill is the primary source of PCE to the groundwater, it is believed that there is a second source of PCE, located within the East Region of the Site. While the landfill source contains both PCE and DAC, the East Region source apparently contains PCE but no DAC. This suspected second source is believed to be smaller than the landfill source. The Eastern Region source area was generally believed to be located near the active production areas of the plant. Contamination from this area may have originated from a combination of past drum and pipe leaks. Due to its proximity to buildings and active production areas, source evaluation was limited to monitoring wells in nearby locations. These wells indicated the presence of dense nonaqueous phase liquid (DNAPL) and a smaller source footprint compared to the West Region of the Site. The presence of DNAPL in fractured bedrock prevents any active source area remediation due to the strong potential for loss of contaminant equilibrium, resulting in movement of concentrated contaminants.

These two sources have resulted in two separate PCE plumes, the "West Plume" and the "East Plume" (Figure 3). Appendix B summarizes groundwater/surface water data from the latest sampling event conducted in April/May 2012. Figures 1 through 6 of Appendix B depict the PCE concentrations from the monitoring wells located in the stratigraphic layers at the Site, from the Overburden to the Blanding.

PCE and its breakdown products, also called "daughter products," can be biodegraded under certain conditions. Benzene and similar organics found in DAC are easily biodegraded, thus limiting their migration from the landfill or from the DAC storage and handling area. Migration of PAHs is limited due to poor mobility in soil and groundwater. Figure 8 of Appendix B depicts the concentrations of the COCs other than PCE that were detected during the April/May 2012 sampling event.

Past releases of nitrogen-containing chemicals from the former fertilizer manufacturing operations southeast of the Site - the PCS Nitrogen area - have resulted in substantial ammonia and nitrate concentrations in the groundwater under and downgradient of the former fertilizer facility. The location and extent of the nitrate plume is indicated on Figure 3. As a result of these past releases of nitrogen-containing chemicals, the groundwater located downgradient of the Chemplex East Region and the former fertilizer plant is no longer a viable long-term source of potable water for downgradient areas. However, the aquifer is still classified by the State as a drinking water aquifer.

2.4 Original Remedy

2.4.1 First Operable Unit Remedy

Through the OU1 ROD, the EPA selected a groundwater extraction and treatment system to remediate contaminated groundwater beneath the landfill and the DAC storage and management area. The extent of the presence of PCE in the form of DNAPL was not known at the time that the OU1 ROD was issued by the EPA. DNAPLs are liquids that are heavier than, and do not mix well with, water, including groundwater.

Based on groundwater monitoring data collected between October 1989 and March 1990, the presence of DNAPL was confirmed. In the OU1 ROD, the EPA selected groundwater extraction and treatment as the remedy to address contaminated groundwater. This ROD Amendment revises that remedy by selecting an enhanced exposure control remedy which includes the following: (1) expanded groundwater and surface water monitoring; (2) permanent shutdown of the groundwater extraction and treatment system; (3) establishment of a TI zone; (4) performance of in situ hot spot treatment; (5) extension of the city of Camanche municipal water supply system; and (6) institutional controls. For reasons described below, this enhanced exposure control remedy will replace the groundwater extraction, pretreatment, treatment and discharge components of the remedy as selected in the OU1 ROD.

The presence of DNAPL resulted in the EPA modifying the remedy through an "Explanation of Significant Differences," or "ESD," which it issued on July 26, 1991. The ESD was followed by a Consent Decree dated November 7, 1991, which was entered into between the United States and several defendants. This Consent Decree required the implementation of the remedy as set forth in the OU1 ROD, as modified by the ESD.

Because available technologies are not able to effectively remove or otherwise remediate the DNAPL present at the Site, the remedial approach described in the ESD focused instead on containing the VOCs found in Site groundwater. To implement this containment approach, the ESD established a "Point of Compliance" boundary. For areas of contaminated groundwater located outside of this Point of Compliance boundary, called the "Attainment Areas," the ESD called for extracting and treating groundwater in an effort to meet health-based cleanup standards for groundwater. The Point of Compliance Boundary is shown on Figure 4.

For the contaminated groundwater within the Point of Compliance boundary, the objective at the time that the ESD was issued was the removal and containment of contaminant mass to the extent practicable so that this chemically-impacted area would no longer act as a source of contamination for the Attainment Areas. The ESD also recognized the possibility of implementing alternative approaches to addressing contaminated groundwater if it was demonstrated that groundwater extraction and treatment could not restore groundwater to drinking water standards outside of the Point of Compliance boundary.

The Site groundwater extraction and treatment system began operating in 1994 and consisted of 50 extraction wells screened at various depths in the soil overburden and underlying bedrock layers. When the system was in operation, extracted groundwater was conveyed to the Chemplex groundwater treatment system in two process streams. One stream, anticipated to contain both PAHs and VOCs, was labeled the Base-Neutral/Acid (BNA) Stream[2]. The other stream, anticipated to contain only VOCs, was referred to as the VOC Stream. The BNA and VOC Streams were passed through separate air stripping towers to remove VOCs. The BNA Stream also flowed through granular activated carbon to remove PAHs. After treatment, the two streams were combined and discharged to the Mississippi River through a permitted outfall shared with the neighboring Equistar polyethylene plant.

The groundwater recovery and treatment system was placed into standby mode on September 29, 2008, as part of a "Performance Test" of a revised remedial alternative as discussed in more detail in Sections 3.2 through 3.4 below. Cumulatively, approximately 28,000 pounds of VOCs had been removed by the groundwater extraction and treatment system as of that date.

[2] "Base-neutral/acid" refers to a type of analytical test used to detect PAHs.

2.4.2 Second Operable Unit Remedy

The Second Operable Unit, also called "OU2," focused on remediating contaminated soil. OU2 remedial actions included constructing a low-permeability cover over the Chemplex Landfill and performing LGE to reduce VOC mass remaining in the landfill. The ROD for OU2, issued by the EPA on May 12, 1993, provides that the Remedial Action Objectives for these measures were to eliminate direct contact threats posed by the contaminated soils and wastes and reduce contaminant migration from soils and wastes to groundwater. The EPA and certain defendants entered into a Consent Decree for the implementation of the OU2 ROD. This Consent Decree became effective in February 1995.

The OU2 Statement of Work, an appendix to the OU2 Consent Decree, established cleanup requirements for the soil remedy. To eliminate threats of direct contact with contaminated soil, several areas within or near the polyethylene plant were designated for capping or for construction of vegetative covers, plus the posting of warning signs. These caps and covers have been constructed and are inspected annually and repaired as needed.

To reduce further contaminant migration from landfilled waste to groundwater, the OU2 Statement of Work also called for operating a LGE system for the portion of the Chemplex Landfill above the water table - that is, the "unsaturated zone." Five chemicals, PCE, benzene, toluene, ethylbenzene and xylene, were designated "Target Compounds." As described in the OU2 Statement of Work, the LGE system was to operate either until the Target Compound concentrations decreased in the extracted vapor to certain prescribed levels, or until four years of cumulative operation were recorded for each active LGE well.

The Chemplex Landfill's low-permeability cover and LGE system were constructed in 1997. The LGE system operated from February 1998 to April 2003. The system consisted of 55 LGE wells, a collection system for recovering floating oily materials and a catalytic oxidizer for treating the VOC-containing vapor stream extracted from the LGE wells. The LGE system was permanently shut down once four years of cumulative operation was achieved for all active LGE wells. VOC recovery from the LGE system decreased over time and at the time that the system was shut down, VOC recovery had reached a steady, low rate. Cumulatively, based on vapor flowrates and sample analyses, approximately 53,100 pounds of VOCs were removed by the LGE system, including 32,700 pounds of the five designated Target Compounds. The low permeability landfill cover will continue to be maintained under the revised remedy.

For more information regarding the mass recovery rate of the LGE system, refer to Table 3-2 of Appendix C of the February 2012 Updated Focused Feasibility Study (UFFS).

3. BASIS FOR THE ROD AMENDMENT

This ROD Amendment is based on consideration of the following factors as discussed below:

- The presence of DNAPL and dissolved VOCs in fractured bedrock;
- Groundwater monitoring data collected over the past 17 years;
- Status of bioremediation that is occurring in Site groundwater; and

- The impact of institutional controls that were implemented to minimize the potential for exposure to COCs.

3.1 Presence of DNAPL and Dissolved VOCs in Fractured Bedrock

As described in the UFFS dated February 2012, spent PCE used to unclog process piping during polyethylene manufacturing was reportedly disposed of in the Chemplex Landfill. This spent material then acted as a source of PCE contamination to Site groundwater. After traveling down through the soil overburden, PCE in the form of DNAPL is believed to have migrated vertically and horizontally through fractures in the underlying bedrock. This migration continued until the PCE became immobile due to being absorbed into rock pores or being trapped in dead-end fractures. PCE in the form of DNAPL has not been directly observed in the soil or groundwater at the Site, but the presence of DNAPL has been inferred from PCE concentrations measured in groundwater. PCE has a solubility limit of 150,000 micrograms per liter (µg/L). When concentrations of ten percent of PCE or more are detected in groundwater samples, pure phase product is presumed to be nearby. The ten percent level for PCE is 15,000 µg/L. PCE has been detected in source area monitoring well MW-17C in concentrations as high as 88,000 µg/L as discussed in the ESD.

As discussed in the UFFS, reliable containment and remediation of contaminated groundwater in fractured rock at the Site was not possible utilizing the groundwater extraction and treatment remedy required by the OU1 ROD. There are several reasons for this. Due to the inability of well extraction to capture groundwater from the entire fractured bedrock network, the Site groundwater recovery system has not been able to effectively contain groundwater impacted by VOCs. As a result of these fractured bedrock conditions, groundwater capture by the Site recovery system cannot be significantly improved and made more effective by installing additional extraction wells. The specific bedrock fractures that would need to be intercepted or influenced by the groundwater recovery wells to effectively control VOC migration cannot be identified with existing technologies.

As described in the UFFS, the rate of VOC mass removal progressively declined following the startup of the groundwater extraction and treatment system in 1994. As of 2007-2008, the rate of VOC mass removal had reached a low, steady level of about two pounds per day. This decline suggests that groundwater extraction had removed the more-concentrated PCE from permeable, easy-to-access sand and gravel areas in the overburden and from the larger bedrock fractures. Although significant VOC mass was removed during the early years of operation, data collected over the past several years indicate that the Site groundwater recovery system was later limited to removing residual PCE diffusing back out of the bedrock pores - that is, "back-diffusing" - into groundwater migrating through nearby fractures.

The consequence of such slow, ongoing "back-diffusion" for the Site is that significant PCE mass will persist along the former DNAPL migration pathways long after residual DNAPL has largely disappeared. PCE continues to back-diffuse out of the impacted clay, silt and bedrock into the groundwater which will then continue to migrate. This back-diffusion occurs slowly, limiting the rate of remedial progress. Long-term removal of PCE mass cannot be controlled by how fast groundwater is pumped, but instead is governed by the rate at which PCE back-diffuses out from the impacted silt, clay and dolomite. Thus, additional groundwater extraction would not accelerate the time period for remediation.

The extent of DNAPL and other residual PCE sources in the subsurface is extremely difficult to characterize. Similar to many other fractured bedrock sites, DNAPL has never been directly observed in

soil cores or groundwater monitoring wells at the Site. The difficulty in locating DNAPL and other residual PCE mass is a major obstacle to source remediation at the Site. There are no reliable means of identifying or locating the DNAPL that may remain and there is concern that aggressively looking for it, or attempting to remediate it, could cause residual PCE to mobilize and spread beyond areas where it is already located. Whether or not PCE still exists in the form of DNAPL, most of the remaining PCE mass is now in bedrock pores, from where it will back-diffuse into surrounding groundwater for many decades.

The presence of residual DNAPL in the fractured bedrock also eliminates the potential to effectively remediate the VOC plumes by controlling remaining source areas. Even if all residual DNAPL at the Site source areas could somehow be identified, most of the remaining PCE mass is now located in rock pores, where it cannot be accessed. This remaining mass will continue to diffuse back out of the impacted fractured rock into migrating groundwater.

As a result of these factors, it is technically impracticable from an engineering perspective, using current technologies, to restore groundwater at the Site and achieve the cleanup goals set forth in the 1989 OU1 ROD and 1991 ESD. A technical impracticability waiver of certain existing groundwater cleanup standards, called "Applicable or Relevant and Appropriate Requirements" or "ARARs," is therefore appropriate for this Site and is being invoked through this ROD Amendment. The basis for a technical impracticability waiver of ARARs at the Site is discussed in more detail below.

3.2 Groundwater Monitoring Data

Appendix B contains figures from the latest groundwater/surface water sampling event conducted in April/May 2012. The distribution of PCE measured in Site groundwater is depicted in Figures 1 through 6 of Appendix B. COCs other than PCE that were detected in Site groundwater are depicted in Figure 8 of Appendix B.

Figure 3 of this ROD Amendment illustrates the extent of the groundwater contaminant plume for PCE measured in Site groundwater. As shown on Figures 3 and 4, PCE had already migrated beyond the Point of Compliance boundary in several soil and bedrock layers before the groundwater extraction system was turned on in 1994. This migration beyond the Point of Compliance boundary was reflected in the 1991 ESD. The ESD's objective was to "pull back" the migrating PCE using the groundwater recovery system in an effort to achieve cleanup levels within the "Attainment Areas."

As described in the UFFS, analyses performed in 2007 and 2008 concluded that: (1) a significant portion of the PCE in groundwater in the downgradient Site area was not being recovered; (2) even after many years of extraction system operation, the horizontal extent of the plumes had generally not diminished; and (3) PCE mass in the lower bedrock layers had actually increased in places. Evidence supporting these findings includes the following:

- Downgradient PCE concentration contours had not improved since startup of the groundwater extraction system in 1994. Refer to Figures 6, 7 and 8 which indicate negative head differences or downward vertical gradients for monitoring well pairs MW-65-1/MW-65, MW-83B/MW-83C and MW-101C/MW-101D, respectively.

- PCE concentrations in groundwater monitoring wells have not shown a consistent downward trend. Examples of this are presented in Appendix B. Specifically, extraction wells EW-3a and EW-11a in Figure 2 of Appendix B and MW-116A in Figure 3 of Appendix B evidence this.

- PCE concentrations in deeper monitoring wells, in the Farmers Creek, Lower Hopkinton and Blanding stratigraphic layers, had often increased, indicating that groundwater extraction was pulling PCE-impacted groundwater deeper into the aquifer. Examples of this are evident in review of Appendix B. Refer to monitoring wells MW-109C, EW-14c and MW-73 on Figures 4, 5 and 6 of Appendix B, respectively.

As discussed above in Section 3.1, impacted groundwater has been migrating past the Point of Compliance boundary due to fractures present in the dolomite bedrock. These fractures, which run both horizontally and vertically, are partially interconnected, providing a preferential flow path for migrating groundwater. As previously discussed, dead-end or narrow fractures likely also provide a collection point for contamination.

As shown by years of groundwater monitoring data, the Site's groundwater extraction system has affected the movement of PCE-containing groundwater in downgradient areas. In particular, the "cones of depression" created by the extraction wells have affected the PCE migration in several ways. First, PCE-containing groundwater has moved laterally, such that PCE is found in areas where it was not encountered before. Second, vertical migration, either upward or downward, has been induced between rock layers. Third, groundwater extraction wells have drawn in clean groundwater from outside the plume, further affecting PCE levels. This clean water contains dissolved oxygen, which can inhibit the microbial "reductive dehalogenation" of PCE, an anaerobic (non-oxygen) process that serves to break down PCE biologically into daughter products.

The groundwater extraction and treatment system was placed into standby operation on September 29, 2008, as part of an EPA-approved Performance Test of the "Exposure Control" remedial alternative presented in the UFFS. Figure 3 illustrates the downgradient extent of the PCE plumes in 2008 and again in 2011. The figure indicates that the lateral extent of the PCE plumes has remained nearly stable during the Performance Test.

3.3 Intrinsic Bioremediation and "Hot Spot" Pilot Testing

Biological transformation of VOCs by indigenous bacteria can occur under aerobic (oxygen-containing) conditions or under anaerobic (non-oxygen) conditions. PCE, which does not break down aerobically—that is, in the presence of oxygen—can be degraded under anaerobic conditions by a bacterial process called "reductive dehalogenation" or "reductive dechlorination."

An investigation performed in 1997 and 1998 established that reductive dechlorination under anaerobic conditions is transforming PCE in the upper bedrock layers in the Site's West Region. In this area, hydrocarbons emanating from the Chemplex Landfill serve as an energy source, called "electron donor," for bacteria. This electron donor energy source was found to be available in the West Region groundwater in sufficient quantities such that microorganisms are completely dechlorinating the PCE, eventually creating the non-chlorinated daughter products ethene and ethane.

In an effort to supplement the PCE breakdown by these ongoing biological transformation processes, a pilot test of the treatment of localized "hot spots" of PCE in Site groundwater was conducted in 2009.

The pilot test applied permanganate, a strong chemical oxidant, at one well and vegetable oil, a supplemental "electron donor" that promotes the biological breakdown of PCE, at five other wells. The pilot test results were summarized in a Hot Spot Evaluation Report submitted to the EPA in 2010, which is included in Appendix A of the UFFS. This report indicated that hot spot treatment, using either permanganate to chemically oxidize chlorinated ethenes, or vegetable oil as a supplemental electron donor, was effective in remediating these local PCE hot spots. Based on these results, in situ treatment using vegetable oil or permanganate, or these two agents in sequence was included as a component of a revised groundwater remedy for this Site. More detail regarding the implementation of the hot spot treatment component of the remedy is discussed in Section 4.1.

3.4 Engineering Controls to Mitigate Potential Exposures

During 2009 and 2010, as part of the Performance Test of the revised remedy, an extension of the city of Camanche municipal water system was constructed to serve residences located south of the Site or downgradient of the contaminant plume. The residents had been using private wells for their water supply, thereby creating a potential path for future human exposure to Site COCs. A total of 20 properties, located downgradient of the contaminant plume, were connected to the expanded water system and the existing private wells were removed. Additional properties could be connected to the expanded water system in the future. The location of the municipal water system extension is shown by the orange line on Figure 4.

The water system extension provides additional protection of human health for residents connected to the expanded water system by reducing the risk of exposure to Site COCs in well water.

4. DESCRIPTION OF REVISED REMEDY

Table 1 summarizes the components of the OU1 groundwater remedy and the revised remedy. The components of the 1989 remedy included the following:

- Institutional controls to restrict the use of groundwater within the Point of Compliance Boundary.
- Groundwater recovery by operation of extraction wells in and around the groundwater plumes.
- Treatment of extracted groundwater at a groundwater treatment plant.
- Discharge of the treated groundwater to the Mississippi River through a permitted outfall under a National Pollutant Discharge Elimination System (NPDES) permit.

The revised groundwater remedy includes the following:

- Surface water and groundwater sampling and gauging using an expanded monitoring well network.
- Contingency measures if detected contaminant concentrations exceed certain trigger levels.
- Institutional controls consisting of:

- Environmental covenants prohibiting construction of potable water supply wells screened above the Maquoketa Shale in the area south of the Chemplex Site.

- A city of Camanche ordinance that requires connection of new water services to the city municipal water system in locations where municipal water main connections are available.

- Shutdown and decommissioning of the existing groundwater extraction and treatment system.

- Localized "hot spot" treatment with permanganate or vegetable oil "electron donor" as determined by the EPA to be appropriate based on monitoring data. Implementation of this component of the remedy is discussed in Section 4.1.

- Extension of the city of Camanche municipal water line along 9th Street and 31st Avenue and connection of designated residences to this extension as discussed in Section 3.4.

- Establishment of a "Technical Impracticability Zone" (TI Zone) with the boundary shown on Figure 5. Within this zone, certain groundwater cleanup standards, called "Applicable or Relevant and Appropriate Requirements" or "ARARs," are subject to a "technical impracticability waiver" or "TI Waiver," including selected Maximum Contaminant Levels[3] ("MCLs") for drinking water.

The revised remedy has been determined to be protective of human health and the environment, compliant with ARARs, except to the extent waived and cost-effective. The revised remedy utilizes permanent solutions. CERCLA contains a preference for remedies that employ treatment that permanently and significantly reduces the volume, toxicity or mobility of contamination as a principal element. In this instance, hot spot treatment will be utilized (see below). While a significant quantity of contaminant mass has already been removed from the groundwater through treatment, additional groundwater extraction will have limited and diminishing effects and is expected to spread the contamination. Accordingly, groundwater treatment through extraction is not a component of the revised remedy.

The following sections of this ROD Amendment compare the original remedy and the revised remedy.

4.1 Treatment, Containment, and Storage Components

The 1989 OU1 remedy included a groundwater extraction system with 50 extraction wells screened at various depths in the soil overburden and underlying bedrock layers. When this recovery system was in operation, extracted groundwater was conveyed to the on-Site groundwater treatment system and treated by air stripping and granular activated carbon adsorption. After treatment, the groundwater was discharged to the Mississippi River through an NPDES-permitted outfall shared with the neighboring Equistar polyethylene plant.

The revised remedy includes treatment as well as "institutional controls." Under the revised remedy, treatment is provided by "hot spot" injections, where a strong oxidant, such as permanganate, or an

[3] MCLs are maximum permissible levels of contaminants in water which is delivered to users of a public water system. MCLs are promulgated by the EPA pursuant to the Safe Drinking Water Act.

electron donor, such as vegetable oil, is applied to the targeted groundwater area through wells. A pilot test of hot spot treatment performed in 2009 and 2010 proved effective in mitigating local areas having elevated PCE concentrations in groundwater. The results of the pilot test are discussed in more detail in Appendix A of the UFFS. Figures 2, 3, 4 and 8 of Appendix B indicate the change in concentration levels of the monitoring wells that were injected with vegetable oil or permanganate during the pilot test.

Under the revised remedy, hot spot areas will be identified on a case-by-case basis after evaluating data from the groundwater monitoring network. It is expected that the EPA and settling defendants will discuss each year's monitoring data, considering concentration trends, location and the potential for exposure. For each potential hot spot identified by the EPA, settling defendants will submit a workplan. The contents of the workplan will include a compilation of available data, the injection location(s), the composition of the oxidant or electron donor, a schedule for performing the work and a proposal for follow-up monitoring.

The already-implemented extension of the city of Camanche municipal water pipeline extension to residences located downgradient of the Site reduced the potential for future PCE exposure. During 2009 and 2010, this extension of the city of Camanche municipal water system was constructed to serve downgradient residences as part of the Performance Test. Residential water supply wells were removed and abandoned in accordance with state procedures. Under a city of Camanche ordinance, no new water supply wells may be constructed on these properties. A total of 20 properties were connected to the expanded water system, including all identified residences along 31st Avenue. Residences along this street are located downgradient of the East Region plume and are also south of the former fertilizer manufacturing plant. The orange line on Figure 4 shows the pipeline's location.

4.2 Institutional Control Components

The revised remedy includes the following institutional controls outlined in the Institutional Control Plan (MWH, 2009):

- An ordinance enacted by the city of Camanche that prohibits new private water supply wells in the area downgradient of the Site;

- Environmental covenants on certain properties, including the Equistar polyethylene plant property, the Cross Roads Property which encompasses the former PCS Nitrogen fertilizer plant, and the Chemplex Landfill and lands owned by ACC/GCC. These environmental covenants will:

    - Prohibit the construction of groundwater wells screened above the Maquoketa Shale layer to supply water for human consumption, livestock watering or agricultural use;

    - Require that all new groundwater wells constructed through the Maquoketa Shale formation and screened within underlying layers be sealed during construction and operation to the satisfaction of the EPA and the Iowa Department of Natural Resources (IDNR);

    - Require the written permission of IDNR and the EPA prior to abandoning or removing a groundwater well from the Site or from the Chemplex groundwater monitoring network;

- Prohibit residential use of the referenced properties;

- Prohibit extraction from dewatering groundwater wells or sumps, as well as any activity that may interfere with monitoring or remedial action required by governmental authority; and

- Grant access to EPA, IDNR, ACC/GCC and their authorized contractors to conduct monitoring and other activities required by the EPA or IDNR.

All of these institutional controls have now been implemented.

Figure 4 shows the areas covered by the environmental covenants and by the city of Camanche well ordinance.

4.3 Other Components of the Revised Remedy

Table 2 describes the monitoring program under the revised remedy, as set forth in the Performance Monitoring Evaluation Plan (the "PME Plan") and PME Plan Addendum No. 3. These documents describe monitoring locations and analytical methods.

The revised remedy incorporates contingency measures that can be implemented if detected VOC concentrations exceed certain "trigger" levels. The Site has been divided into monitoring zones as depicted on Figure 9. Table 3 includes the trigger levels. Contingency measures will be implemented as approved by the EPA and IDNR based on consideration of monitoring data and, in certain cases, a Technical Memorandum or focused feasibility study. Potential contingency measures can include one or more of the following:

- Construction of additional monitoring wells,

- Increasing the monitoring frequency at existing monitoring wells,

- Hot-spot injections of electron donor, oxidant, or both, or

- Fencing off or aerating impacted stream segments and posting warning signs.

Section 4.7.2.5 of the UFFS describes these measures in more detail.

4.4 ARARs

The ARARs for the Chemplex groundwater remediation, along with standards "to be considered" (called "TBCs"), were initially identified in Section 5.2 of the 1989 OU1 ROD and in Tables 3A, 3B, 3C, 4A, 4B and 4C of this ROD Amendment. The ARARs tables, labeled "A," "B" and "C" respectively, discuss three types of ARARs, namely "Chemical-Specific," "Location-Specific" and "Action-Specific," for each alternative.

The revised remedy incorporates a "technical impracticability waiver," also called a "TI waiver," of certain drinking water MCLs considered to be chemical-specific ARARs. This TI waiver is established

in recognition that achieving these MCLs within a specific area is technically impracticable from an engineering perspective.

The area within which the waiver is granted, called the TI Zone, is shown on Figure 5. The zone boundaries have been set based on the EPA's review of groundwater monitoring data, particularly in the area downgradient of the Site. The TI zone extends vertically from the ground surface down to the Maquoketa Shale layer.

Table 5 specifies the analytes for which certain ARARs—that is, drinking water MCLs—are waived within the TI Zone. This list is limited to those analytes for which a record of non-attainment is indicated by the monitoring data.

4.5 Effects on Remedial Action Objectives and Expected Outcomes

Remedial Action Objectives, or "RAOs," help guide the development and implementation of remedial approaches. As described in the UFFS, the OU1 Remedial Action Objectives are hereby updated to reflect developments at the Site:

Remedial Action Objective 1: Prevent human exposure to VOCs in groundwater and accessible surface waters at levels greater than a cumulative Hazard Index of 1.0 for non-carcinogenic risks and a cumulative incremental lifetime cancer risk exceeding the range of 10^{-4} (one in ten thousand) to 10^{-6} (one in one million).

- The Hazard Index is defined as the sum of the Hazard Quotients or estimated non-carcinogenic risks for each VOC to which an individual may be exposed in the form of groundwater. Each VOC's contribution to the Hazard Index is the estimated potential dosage divided by the "reference dose," for drinking water exposures and other oral exposures, or by the "reference concentration," for inhalation exposures.

- Carcinogenic risks are estimated by multiplying the projected dosage for each VOC by either (1) the Cancer Slope Factor, for drinking water exposures and other oral exposures, or (2) the Unit Risk Factor, for inhalation exposures.

Remedial Action Objective 2: Limit exposure by potential ecological receptors in Rock Creek and downgradient surface waters to:

- PCE at levels exceeding 98 µg/L in designated surface waters,

- Trichloroethene (TCE) at levels exceeding 80 µg/L,

- 1,2-Dichloroethene (1,2-DCE) at levels exceeding 590 µg/L, and

- Vinyl chloride (VC) at levels exceeding 930 µg/L.

Remedial Action Objective 3: Prevent migration of Site-related COCs, above the health-based concentrations described in Remedial Action Objective 1, to those portions of downgradient areas where groundwater is being used as a potable water supply.

If cancer-related risks are projected to exceed the 10^{-4} level based on the assessment of the potential risk posed by Site conditions, then additional response actions would be required and the 10^{-6} level is used as the "point of departure" for evaluating remedial alternatives. If the cancer-related risk is between 10^{-4} and 10^{-6}, the EPA will determine if additional response actions are necessary. Cleanup is generally not required if the cancer-related risk is less than 10^{-6}.

Based on the assessments documented in the UFFS and after review of Site monitoring data, the revised remedy satisfies all Remedial Action Objectives. The OU1 remedy, which relies on an extraction and treatment remedial approach, would not meet Remedial Action Objective 3 in the long term because effective and reliable VOC capture was not found to be feasible in the fractured bedrock. The revised remedy provides long-term protection of human health by extending the municipal water system to downgradient residences and by expanding the groundwater and surface water monitoring network.

Table 5 compiles the previous and the revised groundwater cleanup levels for areas outside the TI Zone. The UFFS presents rationale for updating certain groundwater cleanup goals.

5. EVALUATION OF ALTERNATIVES

The NCP requires that the original remedy and the revised remedy be compared using the following nine criteria:

- Overall protection of human health and the environment
- Compliance with ARARs
- Long-term effectiveness and permanence
- Reduction of toxicity, mobility or volume through treatment
- Short-term effectiveness
- Implementability
- Cost
- State acceptance
- Community acceptance

Table 6 summarizes this comparison. Each criterion is also discussed below.

5.1 Overall Protection of Human Health and the Environment

The 1989 groundwater remedy implementing groundwater extraction and treatment does not effectively protect human health because of the potential for future exposure to PCE-contaminated groundwater and the impossibility of complete capture of PCE-containing groundwater due to the fractured bedrock conditions. Under these conditions, neither extracting from the Chemplex groundwater recovery system at a greater flowrate nor adding more recovery wells would result in effective and reliable VOC capture.

The potential for human exposure to VOCs in groundwater, in particular from the use of private water supply wells, would thus remain if the groundwater remedy selected in 1989 continues to be implemented.

The revised remedy will increase protection of human health because it reduces the potential risk of future exposure to PCE through (1) the already-completed construction of the municipal waterline extension, and (2) a prohibition, by city ordinance, on the use of private wells. Further protection will be provided by natural attenuation processes, hot spot treatment through oxidant or electron donor application and groundwater and surface water monitoring. Based on the results of the EPA-approved Performance Test conducted from 2008 to 2011, PCE concentrations are not expected to pose a risk to ecological receptors in surface water.

The groundwater monitoring data indicate multiple lines of evidence that natural attenuation processes including microbial reductive dehalogenation, dispersion and advection are working at the Site. The most recent groundwater monitoring data from the April/May 2012 sampling event are included as Appendix B of this ROD Amendment. As shown on Figure 8 of Appendix B, the daughter products of PCE which are TCE, cis-1,2-DCE and VC, are being produced. The presence of these daughter products indicates that dehalogenation processes are working at the Site. As shown on Figures 1 through 6 of Appendix B, PCE concentrations in the downgradient areas of the groundwater monitoring network are typically low and stable or decreasing. (Refer to more discussion of this in Section 3.2). As shown on Figure 3, the downgradient extent of the PCE plume has been stable from 2008 to 2011. Review of the figures from Appendix B indicates that the plume is still stable. Dehalogenation and plume stability are the lines of evidence that indicate natural attenuation processes are working.

Institutional controls have also been established, including the city of Camanche well ordinance, environmental covenants and land owner agreements. These controls provide additional protection of human health and the environment through land and groundwater use restrictions.

5.2 Compliance with ARARs

Drinking water MCLs established pursuant to the Safe Drinking Water Act are chemical-specific ARARs for the Site. The groundwater cleanup levels established in this ROD Amendment continue to be based on drinking water MCLs. The EPA has determined that it is technically impracticable from an engineering perspective to restore groundwater to such cleanup levels within the TI Zone using any current technology. Given the conditions at the Site and upon review of the Site's monitoring data, the EPA has determined that a technical impracticability waiver of certain chemical-specific ARARs is appropriate for the Site. Figure 5 shows the delineation of the TI Zone and Table 5 identifies the specific cleanup levels that have been waived within the TI Zone.

EPA has further determined that compliance with cleanup levels outside the TI Zone will be assessed by monitoring groundwater along and upgradient from the TI Zone boundary.

5.3 Long-Term Effectiveness and Permanence

The existing OU1 groundwater remedy does not effectively, on a long-term basis, prevent possible future migration of PCE-containing groundwater and cannot achieve cleanup goals downgradient of the Site.

The revised remedy, which does not include the continued operation of the OU1 groundwater extraction system, will provide more long-term effectiveness and permanence than operation of the extraction system because it allows for flattening of the gradients and natural attenuation of the COCs. The hot spot treatment component of the revised remedy will provide further treatment of the COCs in areas with elevated concentrations.

The revised remedy will control long-term exposure as most downgradient residences have been connected to the municipal water system and private residential water wells have been properly removed and abandoned. Future drilling of drinking water wells will be prohibited under the city of Camanche ordinance. Thus, residents in the long term will be protected against potential exposure to PCE-containing groundwater.

5.4 Reduction of Toxicity, Mobility or Volume through Treatment

Under the 1989 OU1 groundwater remedy, VOCs in extracted groundwater were removed by the groundwater treatment system. In addition, as demonstrated during field investigations (EKI, 1998), biodegradation is occurring in the West Region, with limited biodegradation in the East Region. However, the OU1 remedy appeared to interfere with the natural biodegradation processes by increasing groundwater velocities and by drawing in oxygen-containing groundwater into the extraction well network. The extraction well system also pulled chemical mass down into deeper bedrock zones.

The revised remedy will reduce VOC toxicity, mobility and volume through localized treatment of VOC "hot spots" by adding an electron donor or a strong oxidant. By restoring pre-pumping groundwater flow patterns, the revised remedy will also help restore natural biodegradation processes, promoting additional reduction of contaminant toxicity, mobility and volume.

5.5 Short-Term Effectiveness

The OU1 groundwater remedy may have been effective in the short term, as Site chemicals have not been found in private water supply wells at levels of concern.

The revised remedy will be effective in the short term and the long term, since residents connected to the municipal water system are protected against potential exposure to PCE-containing groundwater.

5.6 Implementability

The revised remedy has also been shown to be implementable as reflected by the Performance Test of the remedy conducted from 2008 to 2011.

5.7 Cost

As described in the UFFS, continuing the 1989 OU1 remedy does not require the expenditure of further capital costs, but does require expenditure of estimated total operation and maintenance costs of $51.9 million through 2039, equivalent to $27.9 million on a present worth basis.

The revised remedy will require the expenditure of $8,000,000 of estimated capital costs and $19.7 million of operation and maintenance costs, equivalent to a total present worth of $18.6 million.

The present worth costs were calculated based on an Equivalent Uniform Annual Interest Rate of five percent. Detailed cost tables are included on Tables 5-2 through 5-10 of the UFFS.

5.8 Support Agency Acceptance

IDNR has participated with the EPA over the past several years in the development of the revised remedy and in the assessment of regional groundwater conditions. IDNR supports the revised remedy and considers it preferable to the 1989 OU1 remedy.

5.9 Community Acceptance

The EPA sought public comment on the Proposed Plan, with a public comment period extending from February 17 through March 19, 2012. A public meeting was held in Camanche on February 27, 2012. Relevant documents were available for review at the EPA Records Center in Lenexa, Kansas and at the Camanche Public Library.

Comments received during this public comment period were considered in the development of this ROD Amendment. A responsiveness summary showing public comments and the EPA's responses is provided as Appendix A to this ROD Amendment. Public comments on the Proposed Plan were generally focused on potential surface water impacts. It is the EPA's judgment that surface waters will be adequately protected through implementation of the revised remedy. The lack of other comments on the revised remedy suggests that the community is not unsupportive of the revised remedy.

6. SUPPORT AGENCY COMMENTS

This ROD Amendment has been prepared in consultation with the IDNR. Support agency concerns were addressed through an informal consultation process. An email indicating IDNR's concurrence on the ROD Amendment is included in Appendix C and in the Administrative Record for this ROD Amendment.

7. STATUTORY DETERMINATIONS

Under Section 121 of CERCLA and under the NCP, the lead regulatory agency must select remedies that: (1) are protective of human health and the environment; (2) comply with ARARs (unless a statutory waiver such as a TI waiver is obtained); (3) are cost effective; and (4) utilize permanent solutions and alternative treatment technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment to permanently and significantly reduce the volume, toxicity or mobility of wastes as a principal element and a bias against off-site disposal of untreated wastes.

The following sections discuss how the revised remedy meets these statutory requirements.

7.1 Protection of Human Health and the Environment

The revised remedy will be protective of human health by providing a municipal water source to downgradient residents for domestic use, thereby preventing potential future exposure to contaminated groundwater via domestic use of private wells. The municipal waterline extension and individual residential connections have been completed.

Further protection will be provided through natural attenuation, treatment through oxidant or electron donor application at identified VOC "hot spots" and groundwater and surface water monitoring. The presence of multiple lines of evidence to support natural attenuation is discussed in more detail in Section 5.1 of this ROD Amendment. Institutional controls, consisting of a city ordinance, environmental covenants and land owner agreements, will provide additional protection of human health by minimizing residential exposure to impacted groundwater obtained from private wells.

7.2 Compliance with ARARs

The revised remedy will comply with ARARs with the exception of certain chemical-specific ARARs waived within the TI Zone by means of a TI Waiver. Outside the TI Zone, ARARs are anticipated to be met, including MCLs set forth by the Safe Drinking Water Act. Federal and state surface water quality standards are also expected to be met. Remedial Action Objectives pertaining to protection of potential human and ecological receptors will be achieved.

7.3 Cost Effectiveness

Section 300.430 of the NCP states that: "a remedy shall be cost-effective if costs are proportional to its overall effectiveness." The revised remedy will allow a more cost-effective approach to protecting human health and the environment.

7.4 Utilization of Permanent Solutions and Alternative Treatment Technologies or Resource Recovery Technologies to the Maximum Extent Practicable

The revised remedy, due to extension of the municipal water system westward along 9th Street, represents a permanent solution to potential exposure to contaminated groundwater for the serviced downgradient residences. The remedy will also include localized treatment and destruction of VOC mass through chemical oxidation or using enhanced biodegradation technologies such as addition of supplemental electron donor.

7.5 Preference for Treatment as a Principal Element

Under the revised remedy, localized "hot spot" treatment through oxidation or electron donor addition will satisfy the statutory preference for remedies that employ treatment as a principal element. The revised remedy is also anticipated to restore conditions conducive to promoting biodegradation and other natural attenuation processes.

7.6 Treatment of Principal Threat Wastes

The NCP establishes an expectation that the EPA will use treatment to address the principal threats posed by a site, whenever practicable (NCP § 300.430[a][1][iii][A]). The "principal threat" concept is applied to the characterization of "source materials" at a Superfund site. A source material is a material that includes or contains hazardous substances, pollutants or contaminants that act as a reservoir for migration of contamination to groundwater, to surface water, to air or acts as a source for direct exposure. Contaminated groundwater generally is not considered to be a source material; however, non-aqueous phase liquids (NAPLs) in groundwater may be viewed as source material.

As discussed in Section 2.3, source contamination exists in the West Region and East Region of the Site as depicted on Figure 1. Contamination in these areas, which include contaminated source soils and DNAPL in fractured bedrock, could potentially be considered principal threat wastes. These wastes have been and it is expected that they will continue to be, sources of groundwater contamination. As discussed in Section 2.4.2, operation of the OU2 LGE was effective in substantially removing contaminated source materials in the Landfill Area in the West Region of the Site. Section 2.3 explains the rationale for not conducting further investigation and remediation in the Eastern Region source area. The preference for treatment of principal threat waste has been satisfied through the operation of the LGE system and will be further satisfied through the hot spot treatment which is a component of the revised remedy.

7.7 Five-Year Review Requirement

Because the revised remedy will result in contaminants remaining on the Site above levels that allow for unlimited groundwater use and unrestricted exposure, a statutory review will be conducted within five years after completion of the 2009 Five-Year Review to ensure that the remedy is and will remain protective of human health and the environment. The due date for the next Five-Year Review is June 5, 2014.

8. PUBLIC PARTICIPATION COMPLIANCE

The Proposed Plan for this ROD Amendment was issued for public comment in accordance with Section 117 of CERCLA, as amended, and Paragraph 300.435(c)(2)(ii) of the NCP. The Proposed Plan was made available on February 17, 2012, in the Administrative Record file at the following locations:

Camanche Public Library
102 12th Avenue
Camanche, Iowa 52730
(563) 259-1106

U.S. EPA Records Center
Region 7
11201 Renner Boulevard
Lenexa, Kansas 66219

A public notice was published in the Clinton Herald on February 17, 2012, announcing the commencement and duration of the public comment period and the availability of the Administrative Record file for public review. The public comment period extended from February 17 through March 19, 2012.

A public meeting was held on February 27, 2012, at Garner Hall in Camanche, Iowa to present details related to the Proposed Plan and to solicit public comments. The Responsiveness Summary provided in Appendix A addresses comments received on the Proposed Plan.

9. DOCUMENTATION OF CHANGES FROM PROPOSED PLAN

There are no material changes to the revised remedy from the description provided in the Proposed Plan.

10. REFERENCES[4]

EKI. 17 March 1998. *Natural Attenuation Investigation: Summary of August 1997 In-Situ Groundwater Sampling, First Operable Unit, Chemplex Site, Clinton, Iowa.* Letter to Nancy Swyers, P.E., EPA, Region VII, from James E. Anderson, Ph.D, and Thomas J. Belick.

EKI. 8 February 2012. *Updated Focused Feasibility Study, Operable Unit No. 1 for Groundwater, Chemplex Site, Clinton, Iowa.* Erler & Kalinowski, Inc,

EPA. September 1989 (1989a). *Record of Decision – The Landfill and DAC Areas – Groundwater Operable Unit, Chemplex Site, Clinton, Iowa.* EPA, Region 7, Kansas City, Kansas.

EPA. 28 September 1989 (1989b). *Consent Decree for the Remedial Design/Remedial Action.* (Entered 1991.)

EPA. 13 May 1993 (1993). *Record of Decision – Soils and Wastes Operable Unit, Chemplex Site, Clinton, Iowa (OU 2).*

EPA. 6 February 1995. *Consent Decree for the Remedial Design/Remedial Action – Chemplex Site, Clinton, Iowa (OU 2).*

Golder Associates. 31 December 1998. *Final Construction Completion Report, Chemplex Site, Operable Unit No. 2.*

MWH, February 2009. *Institutional Control Plan for Chemplex Site.*

MWH, December 2010. *Hot Spot Pilot Test Evaluation Report for Chemplex Site in Clinton, Iowa.*

MWH, 2 April 2012. *PME Plan Addendum 3, Chemplex Site – 2012 Sampling and Gauging Schedule.*

[4] The referenced documents are included in the Administrative Record for the Site or through the EPA's Regional Records Center. All documents are publicly available upon request.

Tables

TABLE 1
Summary of Remedy Options

Component	1989 OU-1 Remedy (Pump and Treat)	Revised Remedy (Enhanced Exposure Control)
Institutional Controls	• Maintain existing signs around Chemplex Landfill and other Second Operable Unit (OU-2) areas • Maintain existing Point of Compliance (POC) boundary	• Establish covenants restricting construction of potable water supply wells screened above the Maquoketa Shale. • Promugate an ordinance to require connection of new water services to the City of Camanche municipal water system in downgradient areas where municipal water main connections are available (such an ordinance has already been implemented as part of the Performance Test of a potential new *groundwater remedy*). • Maintain existing signs around Chemplex Landfill and other Second Operable Unit (OU-2) areas
Active Remediation	• Operate groundwater extraction for containment purposes in accordance with the First Operable Unit (OU-1) Consent Decree and Explanation of Significant Differences.	• Permanently shut down the existing groundwater recovery and treatment system. • Perform localized "hot spot" treatment as required by EPA based on monitoring monitoring data.
Engineering Controls	• Maintain the Chemplex Landfill and Second OU-2 study area vegetative covers • ACC/GCC and Lyondell/Equistar to maintain existing fencing around Chemplex Landfill and other OU-2 areas	• ACC/GCC and Lyondell/Equistar to maintain existing fencing around Chemplex Landfill and other OU-2 areas. • Extend City of Camanche municipal water pipeline extension along 9th Street, 31st Avenue, and 37th Avenue; connect designated residences located potentially downgradient of groundwater plumes (already implemented as part of Performance Test). • Maintain the Chemplex Landfill and Second OU-2 study area vegetative covers

TABLE 1
Summary of Remedy Options

Component	1989 OU-1 Remedy (Pump and Treat)	Revised Remedy (Enhanced Exposure Control)
Monitoring	• Continue quarterly groundwater level gauging in accordance with the Project Monitoring Evaluation Plan (PME Plan) • Continue monitoring groundwater treatment system performance in accordance with the current National Pollutant Discharge Elimination System (NPDES) permit • Continue annual monitoring of in-situ groundwater and the Western Un-Named Tributary in accordance with the PME Plan, and monitoring of Lyondell/Equistar Production Well Nos. 1, 4, 6, and 7 every two years for VOCs	• Conduct monitoring in accordance with the plans described in Table 2 and in the PME Plan, including construction of new monitoring wells (already implemented as part of Performance Test). • Monitor Lyondell/Equistar Production Well Nos. 1, 4, 6, and 7 every two years for VOCs
Potential Contingency Measures	• Additional groundwater extraction wells could be constructed in the downgradient East Plume area, with the permission of affected landowners. • If surface water chemical levels exceed applicable water quality criteria, affected areas could be fenced off and warning signs posted. Localized aeration of stream segments could also be considered.	Contingency Measures could consist of one or more of the following potential measures: • Specific contingency measures would be implemented based on consideration of submitted monitoring data and, in certain cases, a Technical Memorandum, in accordance with the procedure described in the Updated Focused Feasibility Study (UFFS). If deemed appropriate, ACC/GCC could also be required to prepare a focused feasibility study to further evaluate available data and potential responses. • If VOC levels in surface water exceed applicable water quality criteria or human health risk levels, affected areas can be fenced off and warning signs posted. Localized aeration of stream segments could also be considered. • Construct additional monitoring wells if VOC levels are confirmed to be elevated. • Implement localized "hot-spot" treatment with permanganate or electron donor such as vegetable oil (pilot study has been successfully completed) • Further extend the City of Camanche municipal water system within the potentially downgradient area.
Technical Impracticability Zone	• Continue to monitor groundwater outside the existing Point of Compliance boundary.	• Establish a Technical Impracticability (TI) Zone, with the approximate boundaries shown on Figure 5. Within the TI Zone, chemical-specific ARARs (Applicable or Relevant and Appropriate Requirements), including drinking water primary Maximum Contaminant Levels (MCLs) indicated in Table 5, would be waived. MCLs would still be applicable and enforceable outside the TI Zone. • The existing Point of Compliance boundary would no longer be in effect.

TABLE 2

Summary of Monitoring Plan Under Revised Remedy

Sample Location	Stratigraphic Layer	Gauging Frequency	Sampling Frequency (VOCs)	Monitoring Zone
3	OVB	Semiannual	Semiannual	Routine Monitoring Zone
3A	OVB	Semiannual	None	-
4	OVB	Semiannual	None	-
ARC MW-1	OVB	Semiannual	None	-
ARC MW-2	OVB	Semiannual	None	-
ARC MW-8	OVB	Semiannual	None	-
ARC MW-14	OVB	Semiannual	None	-
ARC MW-200B	LSG	Semiannual	Semiannual	Routine Monitoring Zone
ARC MW-200C	FC	Semiannual	Semiannual	Routine Monitoring Zone
ARC MW-200D	LH	Semiannual	Semiannual	Routine Monitoring Zone
ARC MW-201B	LSG	Semiannual	Annual	Contingency Well Trigger Zone
ARC MW-201C	FC	Semiannual	Annual	Contingency Well Trigger Zone
ARC MW-205B	LSG	Semiannual	Annual	Contingency Well Trigger Zone
ARC MW-205C	FC	Semiannual	Annual	Contingency Well Trigger Zone
ARC MW-205D	BL	Semiannual	Annual	Contingency Well Trigger Zone
ARC MW-206B	LSG	Semiannual	Annual	Contingency Well Trigger Zone
ARC MW-207B	LSG	Semiannual	Annual	Heightened Awareness Zone
ARC MW-207C	FC	Semiannual	Semiannual	Heightened Awareness Zone
ARC MW-208B	LSG	Semiannual	Annual	Heightened Awareness Zone
ARC MW-208C	FC	Semiannual	Annual	Heightened Awareness Zone
ARC MW-209BC	LSG/FC	Semiannual	Semiannual	Heightened Awareness Zone
ARC MW-210BC	LSG/FC	Semiannual	None	-
ARC MW-211B	LSG	Semiannual	None	-
ARC MW-211C	FC	Semiannual	Semiannual	Contingency Well Trigger Zone
ARC MW-212B	LSG	Semiannual	None	-
ARC MW-212C	FC	Semiannual	None	-
DAC-1	OVB/USG	Semiannual	None	-
DG-16	USG	Semiannual	Annual	Routine Monitoring Zone
DG-17B	USG	Semiannual	None	-
DG-18B	LSG	Semiannual	Semiannual	Routine Monitoring Zone
DG-19B	USG	Semiannual	None	-
DG-21B	USG	Semiannual	Semiannual	Routine Monitoring Zone
DG-21C	LSG	Semiannual	Semiannual	Routine Monitoring Zone
EW-3a	USG	Once in 2012	Once in 2012	Routine Monitoring Zone
EW-6b	FC	Semiannual	None	-
EW-6c	LH	Semiannual	Semiannual	Routine Monitoring Zone
EW-7a	USG	Semiannual	Semiannual	Routine Monitoring Zone
EW-7b	FC	Once in 2012	Once in 2012	Routine Monitoring Zone
EW-7c	LH	Semiannual	None	-
EW-8a	USG	Semiannual	None	-
EW-10a	USG	Semiannual	None	-
EW-11a	USG	Semiannual	Annual	Routine Monitoring Zone
EW-11b	FC	Semiannual	Semiannual	Routine Monitoring Zone
EW-11c	LH	Semiannual	Annual	Routine Monitoring Zone
EW-13b	FC	Semiannual	Annual	Routine Monitoring Zone

TABLE 2
Summary of Monitoring Plan Under Revised Remedy

Sample Location	Stratigraphic Layer	Gauging Frequency	Sampling Frequency (VOCs)	Monitoring Zone
EW-13c	LH	Semiannual	None	-
EW-14b	FC	Semiannual	Annual	Routine Monitoring Zone
EW-14c	LH	Semiannual	Semiannual	Routine Monitoring Zone
EW-15a	USG	Semiannual	None	-
EW-16c	LH	Semiannual	None	-
EW-18a	USG	Semiannual	None	-
EW-19a	USG	Semiannual	None	-
LF-2	OVB/USG	Semiannual	None	-
LF-4	OVB/USG	Semiannual	None	-
LF-6	OVB/USG	Semiannual	None	-
Munck Residence	Unknown	None	Annual	Routine Monitoring Zone
MW-4	OVB	Semiannual	None	-
MW-18B	USG	Semiannual	Annual	Routine Monitoring Zone
MW-18C	LSG	Semiannual	Semiannual	Routine Monitoring Zone
MW-19B	USG	Semiannual	None	-
MW-30B	USG	Semiannual	None	-
MW-53A	OVB	Semiannual	Semiannual	Routine Monitoring Zone
MW-56	FC	Semiannual	None	Routine Monitoring Zone
MW-56-1	USG	Semiannual	None	Routine Monitoring Zone
MW-57	BL	Semiannual	None	Routine Monitoring Zone
MW-57-1	USG	Semiannual	Semiannual	Routine Monitoring Zone
MW-58	USG	Semiannual	None	-
MW-70	BL	Semiannual	Annual	Routine Monitoring Zone
MW-73	BL	Semiannual	Semiannual	Routine Monitoring Zone
MW-73-1	FC	Semiannual	None	-
MW-73-2	LSG	Semiannual	None	-
MW-74-1	LSG	Semiannual	None	-
MW-81B	LSG	Semiannual	None	-
MW-81C	FC	Semiannual	None	-
MW-82B	LSG	Semiannual	Annual	Routine Monitoring Zone
MW-82C	FC	Semiannual	Annual	Routine Monitoring Zone
MW-83B	LSG	Semiannual	None	-
MW-83C	FC	Semiannual	None	-
MW-85B	LSG	Semiannual	Annual	Routine Monitoring Zone
MW-85C	FC	Semiannual	Annual	Routine Monitoring Zone
MW-85D	BL	Semiannual	None	-
MW-87A	USG	Semiannual	None	-
MW-94A	OVB	Semiannual	Annual	Routine Monitoring Zone
MW-97A	USG	Semiannual	Semiannual	Routine Monitoring Zone
MW-97B	LSG	Semiannual	None	-
MW-97C	FC	Semiannual	Annual	Routine Monitoring Zone
MW-99A	OVB	Semiannual	Semiannual	Routine Monitoring Zone
MW-102E	BL	Semiannual	None	-
MW-103B	LSG	Semiannual	Semiannual	Routine Monitoring Zone
MW-103C	FC	Semiannual	Semiannual	Routine Monitoring Zone

TABLE 2
Summary of Monitoring Plan Under Revised Remedy

Sample Location	Stratigraphic Layer	Gauging Frequency	Sampling Frequency (VOCs)	Monitoring Zone
MW-103D	BL	Semiannual	Semiannual	Routine Monitoring Zone
MW-104B	LSG	Semiannual	Annual	Heightened Awareness Zone
MW-104C	FC	Semiannual	Annual	Heightened Awareness Zone
MW-104D	BL	Semiannual	None	Heightened Awareness Zone
MW-105B	LSG	Semiannual	Semiannual	Contingency Well Trigger Zone
MW-105C	FC	Semiannual	Semiannual	Contingency Well Trigger Zone
MW-105D	BL	Semiannual	None	-
MW-106A	USG	Semiannual	Semiannual	Routine Monitoring Zone
MW-106B	LSG	Semiannual	Semiannual	Routine Monitoring Zone
MW-106C	FC	Semiannual	Semiannual	Routine Monitoring Zone
MW-107A	OVB	Semiannual	Semiannual	Routine Monitoring Zone
MW-107B	LSG	Semiannual	Semiannual	Routine Monitoring Zone
MW-107C	FC	Semiannual	Semiannual	Routine Monitoring Zone
MW-108B	LSG	Semiannual	Annual	Routine Monitoring Zone
MW-108C	FC	Semiannual	Annual	Routine Monitoring Zone
MW-109B	LSG	Semiannual	Semiannual	Routine Monitoring Zone
MW-109C	FC	Semiannual	Semiannual	Routine Monitoring Zone
MW-110B	LSG	Semiannual	Semiannual	Routine Monitoring Zone
MW-111B	LSG	Semiannual	None	-
MW-112A	LSG	Semiannual	Annual	Routine Monitoring Zone
MW-113A	LSG	Semiannual	Semiannual	Routine Monitoring Zone
MW-115A	LSG	Semiannual	None	-
MW-116A	LSG	Semiannual	Semiannual	Routine Monitoring Zone
MW-117B	LSG	Semiannual	Annual	Contingency Well Trigger Zone
MW-117C	FC	Semiannual	Semiannual	Contingency Well Trigger Zone
MW-118C	FC	Semiannual	Annual	Routine Monitoring Zone
MW-119A	OVB	Semiannual	Semiannual	Expedited Contingency Zone
MW-119B	LSG	Semiannual	Semiannual	Routine Monitoring Zone
MW-119C	FC	Semiannual	Semiannual	Routine Monitoring Zone
MW-120A	OVB	Semiannual	Annual	Heightened Awareness Zone
MW-120B	LSG	Semiannual	Annual	Heightened Awareness Zone
MW-121A	OVB	Semiannual	Annual	Expedited Contingency Zone
MW-121B	LSG	Semiannual	Annual	Expedited Contingency Zone
MW-121C	FC	Semiannual	Annual	Expedited Contingency Zone
MW-122A	OVB	Semiannual	Annual	Heightened Awareness Zone
MW-122B	LSG	Semiannual	Annual	Heightened Awareness Zone
MW-122C	FC	Semiannual	Annual	Heightened Awareness Zone
MW-129A	LSG	Semiannual	Semiannual	Routine Monitoring Zone
PB-2	OVB	Semiannual	None	-
PT/RW-1	OVB	Semiannual	None	-
SW-1	-	None	Semiannual	-
SW-2	-	None	Semiannual	-
SW-3	-	None	Semiannual	-
SW-4	-	None	Semiannual	-
WELL1Q	OD	None	Odd Years Only	Routine Monitoring Zone

TABLE 2
Summary of Monitoring Plan Under Revised Remedy

Sample Location	Stratigraphic Layer	Gauging Frequency	Sampling Frequency (VOCs)	Monitoring Zone
WELL4Q	OD	None	Odd Years Only	Routine Monitoring Zone
WELL6Q	OD	None	Odd Years Only	Routine Monitoring Zone
WELL7Q	OD	None	Odd Years Only	Routine Monitoring Zone

Abbreviations:
BL = Blanding
FC = Farmers Creek
LH = Lower Hopkinton
LSG = Lower Scotch Grove
OD = Ordovician Dolomites and sandstones, located below the Maquoketa Shale layer.
OVB = Overburden
SG = Scotch Grove
USG = Upper Scotch Grove
VOCs = volatile organic compounds

Notes:
(1) As described in the Updated Focused Feasibility Study (UFFS), additional monitoring wells may be required based on sampling results in designated upgradient wells. If constructed, these additional monitoring wells, called "contingency wells", would be sampled semiannually for VOC analysis.
(2) Depending on reported analytical results, the frequency of sampling or groundwater elevation gauging at a particular well may be revised if satisfactory to EPA.
(3) The sampling plan is based on Addendum 3 to the Performance Monitoring Evaluation Plan and will be reviewed by EPA annually.

TABLE 3
Trigger Levels for Contingency Measures
Chemplex Site -- Clinton, Iowa

Sampling Point Type and Location	Trigger Levels (ug/L) (a)				Contingency Actions if Trigger Levels Exceeded
	PCE	TCE	cis-1,2-DCE	VC	
Well located in Contingency Well Trigger Zone	10	10	140	1	Contingency Level 1 actions
Well located in Heightened Awareness Zone	5	5	70	0.5	Contingency Level 2 actions
Well located in Expedited Contingency Zone	5	5	70	0.5	Contingency Level 3 actions
Surface water sampling location	98	80	590	25	Surface Water Contingency actions

Notes:
(a) The rationale for the proposed trigger levels is described in the Contingency Plan (EKI, 2008b).

Abbreviations:
cis-1,2-DCE = cis-1,2-Dichloroethene
MCL = Maximum Contaminant Level
ug/L = micrograms per liter
PCE = Tetrachloroethene
TCE = Trichloroethene
VC = Vinyl Chloride

TABLE 3A

Chemical-Specific Applicable or Relevant and Appropriate Requirements for 1989 OU-1 Remedy

Standard, Requirement, Criteria or Limitation	Citation	Description	Comment
FEDERAL			
Safe Drinking Water Act			
National Primary Drinking Water Standards	42 United States Code (USC) §§ 300F-300j-26; 40 Code of Federal Regulations (CFR) Part 141	Establishes maximum contaminant levels (MCLs), which are standards for public water systems.	Relevant and appropriate. The MCLs for organic and inorganic contaminants are applicable to Site groundwater contaminants.
National Secondary Drinking Water Standards	42 USC §§ 300F -300j-26; 40 CFR Part 143	Establishes secondary maximum contaminant levels (SMCLs), which are non-enforceable guidelines for water systems to promote the aesthetic quality of the water.	Not applicable or relevant and appropriate.
Clean Water Act			
Ambient Water Quality Criteria (AWQC)	33 USC §§ 1251-1376; 40 CFR Part 131, Quality Criteria for Water	Requires the states to set ambient water quality criteria (AWQC) based on use classifications and the criteria developed under Section 304(a) of the Clean Water Act.	Applicable. AWQC have been developed for several organic and inorganic contaminants in Site groundwater.

TABLE 3A

Chemical-Specific Applicable or Relevant and Appropriate Requirements for 1989 OU-1 Remedy

Standard, Requirement, Criteria or Limitation	Citation	Description	Comment
FEDERAL (CONTINUED)			
National Pollutant Discharge Elimination System Permit Regulations	33 USC §§ 1251-1376; 40 CFR Parts 122 and 125	Requires permits for the discharge of pollutants from any point source into waters of the United States.	Applicable. The existing groundwater recovery system would continue to operate under its existing NPDES Permit 2300108.
National Pretreatment Standards	33 USC §§ 1251-1376; 40 CFR Part 403 and 414	Sets standards to control pollutants that pass through or interfere with treatment processes in Publicly-Owned Treatment Works (wastewater treatment plants) or that may contaminate sewage sludge.	Not applicable or relevant and appropriate. There will be no discharge into a POTW.
Clean Air Act			
National Primary and Secondary Ambient Air Quality Standards	42 USC §§ 7401-7642; 40 CFR Part 50	Establishes standards for ambient air quality to protect public health and welfare.	This is applicable if contaminants are discharged to the air during the groundwater treatment.
Resource Conservation and Recovery Act	40 CFR Part 265, Subpart AA	Establishes exhaust criteria and treatment-based influent criteria.	Subpart AA is applicable if the influent groundwater has a concentration of total organics exceeding 10 milligrams per liter (mg/L), and the volatile organic compounds (VOCs) emitted from the air stripping towers exceed an annual average of 3.1 tons per year. If both of these conditions are met, then the tower exhaust gas must be treated.

TABLE 3A

Chemical-Specific Applicable or Relevant and Appropriate Requirements for 1989 OU-1 Remedy

Standard, Requirement, Criteria or Limitation	Citation	Description	Comment
STATE			
Iowa Air Pollution Control Regulations	Iowa Code § 567-28.1(455B)	Ambient Air Quality Standards (Adopts 40 CFR 50).	See National Primary and Secondary Ambient Air Quality Standards. The State of Iowa does not require air permits for remediation systems.
	Iowa Code § 567-23.1(455B)	This chapter pertains to emissions from on-site treatment processes.	Not applicable to on-site emission sources at the Chemplex Site. This Site is governed by 40 CFR Part 265, Subpart AA. The State of Iowa does not require air permits for remediation systems.
Iowa Water Pollution Control Regulation	Iowa Code § 567 Chapters 60-61	General definitions; water quality standards, including classification of surface waters;	Applicable to protection of water quality within the Eastern and Western Un-named Tributaries and Rock Creek.
Iowa Water Pollution Control Regulation	Iowa Code § 567 Chapters 62-63	Discharge of pollutants; monitoring, analytical, and reporting requirements pertaining to water disposal systems.	Applicable to protection of water quality within the Eastern and Western Un-named Tributaries and Rock Creek.
Iowa Water Pollution Control Regulation	Iowa Code § 567 Chapter 64	Wastewater construction and operation permits.	Not applicable or relevant and appropriate because the 1989 OU-1 remedy will not encompass construction or operation of a wastewater system.

TABLE 3A

Chemical-Specific Applicable or Relevant and Appropriate Requirements for 1989 OU-1 Remedy

Standard, Requirement, Criteria or Limitation	Citation	Description	Comment
Iowa Responsible Parties Cleanup Regulations	Iowa Code § 567 Chapter 133	These rules establish the procedures and criteria to determine the parties responsible and the cleanup actions necessary to meet the state's groundwater protection goals. These rules pertain to the cleanup of groundwater itself and to soils and surface water areas where groundwater may be impacted.	Applicable to pollutant concentrations in soil or groundwater above State of Iowa Action Levels.
Iowa Land Recycling Program and Response Action Standards	Iowa Code § 567 Chapter 137	Policies and procedures for the voluntary enrollment of contaminated property in the "land recycling program". Response action standards that participants must meet to qualify for a no further action (NFA) certificate, and the statutory protections and immunities that are associated with the NFA.	This is not an Applicable or Relevant and Appropriate Requirement, but is a "To Be Considered" (TBC) guidance standard for the State of Iowa relating to environmental covenants.

TABLE 3B

Location-Specific Applicable or Relevant and Appropriate Requirements for 1989 OU-1 Remedy

Standard, Requirement, Criteria or Limitation	Citation	Description	Comment
FEDERAL			
Clean Water Act	33 USC §§ 1251-1387	Establishes a permit program administered by the U.S. Army Corps of Engineers to regulate the nonpoint source discharges of dredged or fill material into waters of the U.S.	Not applicable or relevant and appropriate. There will not be any nonpoint source discharges.
Protection of Floodplains		Establishes requirements for constructing in floodplains.	Not applicable or relevant and appropriate. There will be no floodplain construction.
Fish and Wildlife Protection		Requires actions that will control or modify a body of water be evaluated to mitigate or compensate for losses of wildlife resources.	Not applicable or relevant and appropriate. Remedy will not significantly affect wildlife resources as long as project-specific surface water criteria are met.
Resource Conservation and Recovery Act	42 USC §§ 6901-6992k	Establishes building criteria for treatment, storage, and disposal (TSD) facilities located in a floodplain.	Not applicable or relevant and appropriate. Remedy will not operate a TSD facility.
STATE			
Clean Water Act	Iowa Code § 567 Chapter 61	CWA Section 401 water quality certification is mandatory for projects requiring a Federal CWA Section 404 permit. Section 401 certification is a state's concurrence that a project is consistent with that state's water quality standards. Also establishes criteria for wetlands.	Not applicable or relevant and appropriate. Remedy will not require a Section 404 permit.

TABLE 3B

Location-Specific Applicable or Relevant and Appropriate Requirements for 1989 OU-1 Remedy

Standard, Requirement, Criteria or Limitation	Citation	Description	Comment
STATE (CONTINUED)			
Floodplain Development	Iowa Code § 567 Chapters 70-76	The State has authority to regulate construction within floodplains and floodways. Chapters 70-76 explain how and when a permit must be obtained for various types of development.	Not applicable or relevant and appropriate. There will be no floodplain construction.
Protected Water Sources	Iowa Code § 567 Chapter 53	The State has authorization to designate protected groundwater sources to restrict the movement of groundwater contaminants.	Not applicable or relevant and appropriate. A groundwater management zone was determined by the State not to be appropriate for this site.

TABLE 3C
Action-Specific Applicable or Relevant and Appropriate Requirements for 1989 OU-1 Remedy

Standard, Requirement, Criteria or Limitation	Citation	Description	Comment
FEDERAL			
Resource Conservation and Recovery Act	42 USC §§ 6901-6992k		
Identification and Listing of Hazardous Wastes	40 CFR Part 261	Defines those solid wastes that are subject to regulation as hazardous wastes under 40 CFR Parts 263-265, 268 and Parts 124, 270 and 271.	Applicable. Identifies wastes considered to be hazardous. Spent granular activated carbon has been generated at the Site and transported off-site under manifest as F002 hazardous waste for off-site reactivation.
Standards Applicable to Generators of Hazardous Waste	40 CFR Part 262	Establishes standards that apply to generators of hazardous waste.	Applicable. Spent granular activated carbon has been generated at the Site and transported off-site under manifest as F002 hazardous waste for off-site reactivation.
Standards Applicable to Transporters of Hazardous Waste	40 CFR Part 263	Establishes standards that apply to transporters of hazardous waste within the U.S. if the transportation requires a manifest under 40 CFR Part 262.	In the event of off-site transportation of hazardous wastes, these standards would be applicable.

TABLE 3C
Action-Specific Applicable or Relevant and Appropriate Requirements for 1989 OU-1 Remedy

Standard, Requirement, Criteria or Limitation	Citation	Description	Comment
FEDERAL: SWDA (CONTINUED)			
Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities	40 CFR Part 264	Establishes national standards that define the acceptable management of hazardous waste for owners and operators of facilities that treat, store or dispose hazardous waste.	Applicable. Hazardous wastes must be managed in accordance with the Resource Conservation and Recovery Act (RCRA).
Land Disposal Restrictions	40 CFR Part 268	Identifies hazardous wastes that are restricted or prohibited from land disposal.	Applicable to off-site land disposal of specific and characteristic hazardous wastes. Spent granular activated carbon, at the Chemplex groundwater treatment facility has been determined to be a listed waste. Spent carbon has been managed by transportation under manifest for off-site reactivation in a furnace.
Hazardous Waste Permit Program	40 CFR Part 270	Covers basic EPA permitting requirements.	A permit is not required for on-site CERCLA response actions. A permit is required for off-site actions if hazardous wastes are to be managed.

TABLE 3C
Action-Specific Applicable or Relevant and Appropriate Requirements for 1989 OU-1 Remedy

Standard, Requirement, Criteria or Limitation	Citation	Description	Comment
FEDERAL (CONTINUED)			
Clean Air Act			
National Ambient Air Quality Standards	42 USC §§ 7401-7671q; 40 CFR Part 50	National primary and secondary ambient air quality standards and treatment technology standards for emissions to air from: • incinerators • surface impoundments • waste piles • treatment units • landfills • fugitive emissions	Applicable. The exhaust gas from the air stripping towers is governed by 40 CFR Part 265, Subpart AA.
Resource Conservation and Recovery Act	40 CFR Part 265, Subpart AA	Establishes treatment system exhaust criteria.	Subpart AA is applicable if the influent groundwater has a concentration of total organics exceeding 10 milligrams per liter (mg/L), and the volatile organic compounds (VOCs) emitted from the air stripping towers exceed an annual average of 3.1 tons per year. If these conditions are met, then the tower exhaust gas must be treated.
Transportation			
Hazardous Materials Regulations	40 CFR Parts 171-173 and 177	Establishes requirements for transportation of hazardous materials.	Applicable to off-site transportation of hazardous materials.

TABLE 3C
Action-Specific Applicable or Relevant and Appropriate Requirements for 1989 OU-1 Remedy

Standard, Requirement, Criteria or Limitation	Citation	Description	Comment
STATE			
Iowa Solid Waste Disposal Regulations	Iowa Code § 567 Chapters 100-121	Establishes standards for sanitary disposal projects and by regulating the disposal of solid waste through a system of general rules and specific permits. Deals with excavation of closed landfills, and the operation, cover, and monitoring of landfills.	Not applicable or relevant and appropriate to groundwater remedy.
Iowa Air Pollution Control Regulations	Iowa Code § 567 Chapter 23	Sets the emissions standards for contaminants and governs the release of fugitive dust in quantities creating a nuisance during site activities and emissions from a treatment system.	Not applicable (see 40 CFR Part 265, Subpart AA).
	Iowa Code § 567Chapter 25	Governs continuous monitoring systems.	Not applicable (see 40 CFR Part 265, Subpart AA).
	Iowa Code § 567 Chapter 28	Ambient Air Quality Standards (adopts 40 CFR Part 50).	Not applicable (see 40 CFR Part 265, Subpart AA)

TABLE 3C
Action-Specific Applicable or Relevant and Appropriate Requirements for 1989 OU-1 Remedy

Standard, Requirement, Criteria or Limitation	Citation	Description	Comment
STATE (CONTINUED)			
Iowa Water Pollution Control Regulations	Iowa Code § 567 Chapter 38	Private water well construction permits.	Applicable for the installation of private water wells for groundwater extraction.
	Iowa Code § 567 Chapter 39	Well abandonment requirements.	Applicable when monitoring or extraction wells are abandoned.
	Iowa Code § 567 Chapter 40	Water supply definitions. Defines the MCLs that Chapter 133 pertains to.	Not applicable or relevant and appropriate. Remedy will not affect drinking water.
	Iowa Code § 567 Chapter 49	These rules refer to nonpublic water wells, setting forth well construction standards, materials standards, and abandonment guidelines.	Applicable for the construction of private water wells for groundwater extraction.
Water Withdrawals	Iowa Code § 567 Chapters 50-54	These rules address water withdrawal permits. Permits are required for withdrawals greater than 25,000 gallons per day.	Applicable for the pump-and-treat alternative because extraction rates exceed 25,000 gallons per day.
	Iowa Code § 567 Chapter 82	Establishes certification requirements for well contractors.	Applicable for well drilling or abandonment. Extraction and monitoring well construction must be completed by a certified well driller.
Solid Waste Management and Disposal	Iowa Code § 567 Chapters 102, 103, 104, and 110	Permitting of solid waste processing and disposal facilities.	Applicable for process or disposal of solid waste.

TABLE 3C

Action-Specific Applicable or Relevant and Appropriate Requirements for 1989 OU-1 Remedy

Standard, Requirement, Criteria or Limitation	Citation	Description	Comment
STATE (CONTINUED)			
Iowa Responsible Parties Cleanup Regulations	Iowa Code § 567 Chapter 133	These rules establish the procedures and criteria to determine the parties responsible and the cleanup actions necessary to meet the state's groundwater protection goals. These rules pertain to the cleanup of groundwater itself and to soils and surface water where groundwater may be impacted.	Applicable to groundwater constituents of concern in excess of State of Iowa Action Levels. Action levels are developed through MCLs or other Health-Based Standards.

TABLE 4A

Chemical-Specific Applicable or Relevant and Appropriate Requirements for Revised Remedy

Standard, Requirement, Criteria or Limitation	Citation	Description	Comment
FEDERAL			
Safe Drinking Water Act			
National Primary Drinking Water Standards	40 USC §§ 300F-300j-26; 40 CFR Part 141	Establishes maximum contaminant levels (MCLs), which are standards for public and certain private water systems.	Relevant and appropriate. The MCLs for organic and inorganic contaminants are applicable to Site groundwater contaminants unless an area has been designated as a Technical Impracticability Zone or otherwise designate as not being a potential source of drinking water. They are applicable to the City's operation of the Camanche municipal water system.
National Secondary Drinking Water Standards	40 CFR Part 143	Establishes secondary maximum contaminant levels (SMCLs), which are non-enforceable guidelines for water systems to promote the aesthetic quality of the water.	SMCLs are relevant and appropriate for the City's operation of the Camanche water system.
Clean Water Act			
Ambient Water Quality Criteria (AWQC)	33 USC §§ 1251-1376; 40 CFR Part 131, Quality Criteria for Water	Requires the states to set ambient water quality criteria (AWQC) based on use classifications and the criteria developed under Section 304(a) of the Clean Water Act.	Applicable. AWQC have been developed for several organic and inorganic contaminants in Site groundwater.

TABLE 4A

Chemical-Specific Applicable or Relevant and Appropriate Requirements for Revised Remedy

Standard, Requirement, Criteria or Limitation	Citation	Description	Comment
FEDERAL (CONTINUED)			
National Pollutant Discharge Elimination System Permit			
Regulations	33 USC §§ 1251-1376; 40 CFR Parts 122 and 125	Requires permits for the discharge of pollutants from any point source into waters of the United States.	Not applicable or relevant and appropriate. The revised remedy will not discharge to waters of the United States.
National Pretreatment Standards	33 USC §§ 1251-1376; 40 CFR Part 403 and 414	Sets standards to control pollutants that pass through or interfere with treatment processes in Publicly-Owned Treatment Works (wastewater treatment plants) or that may contaminate sewage sludge.	Not applicable or relevant and appropriate. Remedy will not discharge to a POTW.
Clean Air Act			
National Primary and Secondary Ambient Air Quality Standards	42 USC §§ 7401-7642; 40 CFR Part 50	Establishes standards for ambient air quality to protect public health and welfare.	Not applicable or relevant and appropriate, since contaminants will not be discharged to the air.

TABLE 4A
Chemical-Specific Applicable or Relevant and Appropriate Requirements for Revised Remedy

Standard, Requirement, Criteria or Limitation	Citation	Description	Comment
FEDERAL (CONTINUED)			
Resource Conservation and Recovery Act	40 CFR Part 265, Subpart AA	Establishes exhaust criteria and treatment-based influent criteria.	Subpart AA is applicable if the influent groundwater has a concentration of total organics exceeding 10 milligrams per liter (mg/L), and the volatile organic compounds (VOCs) emitted from the air stripping towers exceed an annual average of 3.1 tons per year. If these conditions are met, then the tower exhaust gas must be treated.
STATE			
Iowa Air Pollution Control Regulations	Iowa Code § 567 Chapter 28	Ambient Air Quality Standards (Adopts 40 CFR Part 50).	See 40 CFR Part 265, Subpart AA.
	Iowa Code § 567 Chapter 30	This chapter pertains to emissions from on-site treatment process.	This Site is governed by 40 CFR Part 265, Subpart AA if the groundwater treatment equipment is operating.
Iowa Water Pollution Control Regulation	Iowa Code § 567 Chapters 60-64	General definitions; water quality standards, including classification of surface waters; discharge of pollutants; and monitoring, analytical, and reporting requirements pertaining to water disposal systems.	Water quality standards for the state are applicable.

TABLE 4A

Chemical-Specific Applicable or Relevant and Appropriate Requirements for Revised Remedy

Standard, Requirement, Criteria or Limitation	Citation	Description	Comment
STATE (CONTINUED)			
Iowa Responsible Parties Cleanup Regulations	Iowa Code § 567 Chapter 133	These rules establish the procedures and criteria to determine the parties responsible and the cleanup actions necessary to meet the state's groundwater protection goals. These rules pertain to the cleanup of groundwater itself and to soils and surface water where groundwater may be impacted.	Applicable to pollutant concentrations in soil or groundwater above State of Iowa Action Levels.
Iowa Land Recycling Program and Response Action Standards	Iowa Code § 567 Chapter 137	Policies and procedures for the voluntary enrollment of contaminated property in the "land recycling program". Response action standards that participants must meet to qualify for a no further action (NFA) certificate, and the statutory protections and immunities that are associated with the NFA.	Not an Applicable or Relevant and Appropriate Requirement, but a "To Be Considered" (TBC) guidance standard for the State of Iowa relating to environmental covenants.

TABLE 4B

Location-Specific Applicable or Relevant and Appropriate Requirements for Revised Remedy

Standard, Requirement, Criteria or Limitation	Citation	Description	Comment
FEDERAL			
Clean Water Act	33 USC §§ 1251-1387	Establishes a permit program administered by the U.S. Army Corps of Engineers to regulate the nonpoint source discharges of dredged or fill material into waters of the U.S.	Not applicable or relevant and appropriate. Remedy will not involve a nonpoint source discharge to waters of the U.S.
Protection of Floodplains		Establishes requirements for constructing in floodplains.	Not applicable or relevant and appropriate. There will be no construction in floodplains.
Fish and Wildlife Protection		Requires actions that will control or modify a body of water be evaluated to mitigate or compensate for losses of wildlife resources.	Not applicable or relevant and appropriate. Remedy will not cause a loss to wildlife resources.
Resource Conservation and Recovery Act	40 CFR 270.14(b)(11)(iii) and (iv)	Establishes building criteria for treatment, storage, and disposal (TSD) facilities located in a floodplain.	Not applicable or relevant and appropriate. There will be no TSD facility in a floodplain.
STATE			
Clean Water Act	Iowa Code § 567 Chapter 61	Section 401 water quality certification is mandatory for projects requiring a Federal Section 404 permit. Section 401 certification represents a state's concurrence that a project is consistent with that state's water quality standards. Also establishes criteria for wetlands.	Not applicable or relevant and appropriate. Remedy will not require a Section 404 permit.
Floodplain Development	Iowa Code § 567 Chapters 70-76	The State has authority to regulate construction on all floodplains and floodways in the State. Chapters 70-76 explain how and when a permit must be obtained for various types of development.	Not applicable or relevant and appropriate. Remedy will not require construction in a floodplain.

TABLE 4B

Location-Specific Applicable or Relevant and Appropriate Requirements for Revised Remedy

Standard, Requirement, Criteria or Limitation	Citation	Description	Comment
STATE (CONTINUED)			
Protected Water Sources	Iowa Code § 567 Chapter 53	The State has authorization to designate protected groundwater sources to restrict the movement of groundwater contaminants.	May be applicable to groundwater contaminated above State of Iowa Action Levels. However, application for a Chapter 53 designation was not approved.

TABLE 4C

Action-Specific Applicable or Relevant and Appropriate Requirements for Revised Remedy

Standard, Requirement, Criteria or Limitation	Citation	Description	Comment
FEDERAL			
Resource Conservation and Recovery Act	42 USC §§ 6901-6987		
Identification and Listing of Hazardous Wastes	40 CFR Part 261	Defines those solid wastes that are subject to regulation as hazardous wastes under 40 CFR Parts 263-265 and Parts 124, 270 and 271.	Not applicable or relevant and appropriate.
Standards Applicable to Generators of Hazardous Waste	40 CFR Part 262	Establishes standards that apply to generators of hazardous waste.	Not applicable or relevant and appropriate.
Standards Applicable to Transporters of Hazardous Waste	40 CFR Part 263	Establishes standards that apply to transporters of hazardous waste within the U.S. if the transportation requires a manifest under 40 CFR Part 262.	Not applicable or relevant and appropriate.
Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal Facilities	40 CFR Part 264	Establishes national standards that define the acceptable management of hazardous waste for owners and operators of facilities that treat, store or dispose hazardous waste.	Not applicable or relevant and appropriate.
Land Disposal Restrictions	40 CFR Part 268	Identifies hazardous wastes that are restricted or prohibited from land disposal.	Not applicable or relevant and appropriate.
Hazardous Waste Permit Program	40 CFR Part 270	Covers basic EPA permitting requirements.	Not applicable or relevant and appropriate.

TABLE 4C
Action-Specific Applicable or Relevant and Appropriate Requirements for Revised Remedy

Standard, Requirement, Criteria or Limitation	Citation	Description	Comment
FEDERAL (CONTINUED)			
Clean Air Act			
National Ambient Air Quality Standards	42 USC §§ 7401-7671q; 40 CFR Part 50	National primary and secondary ambient air quality standards and treatment technology standards for emissions to air from: • treatment units • landfills • fugitive emissions • incinerators • surface impoundments • waste piles	Not applicable since there will be no discharge to air.
Transportation			
Hazardous Materials Regulations	40 CFR Parts 171-173 and 177	Establishes requirements for transportation of hazardous materials.	Applicable to transportation of hazardous materials as it relates to the injection of permanganate for "hot spot" treatment of elevated VOC concentrations.
Safe Drinking Water Act Underground Injection Control (UIC) Program	42 USC § 300f, 40 CFR Part 144	Requirements pertaining to injection of materials into the subsurface.	Applicable. Substantive requirements will be complied with if injection of a chemical oxidant or electron donor into the subsurface is performed.

TABLE 4C
Action-Specific Applicable or Relevant and Appropriate Requirements for Revised Remedy

Standard, Requirement, Criteria or Limitation	Citation	Description	Comment
STATE			
Iowa Environmental Quality Act	Iowa Code § 567	Defines the jurisdiction of the Department of Natural Resources, and defines powers and duties of the Commission and the Director.	State acceptance is to be considered during evaluation of alternatives.
Iowa Solid Waste Disposal Regulations	Iowa Code § 567 Chapters 100, 101, 102, 103, 110	Establishes standards for sanitary disposal projects and by regulating the disposal of solid waste through a system of general rules and specific permits. Deals with excavation of closed landfills, and the operation, cover and monitoring of landfills.	Not applicable to groundwater remedy.
Iowa Air Pollution Control Regulation	Iowa Code § 567 Chapter 23	Sets the emissions standards for contaminants and governs the release of fugitive dust in quantities creating a nuisance during site activities and emissions from a treatment system.	Not applicable or relevant and appropriate.
	Iowa Code § 567 Chapter 24	Applies to emissions from a permitted emission point. Could be applied to excess emissions of fugitive dust.	Not applicable or relevant and appropriate.
	Iowa Code § 567 Chapter 25	Governs continuous monitoring systems.	Not applicable (see 40 CFR Part 265, Subpart AA).
	Iowa Code § 567 Chapter 28	Ambient Air Quality Standards (Adopts 40 CFR Part 50).	Not applicable (see 40 CFR Part 265, Subpart AA).

TABLE 4C

Action-Specific Applicable or Relevant and Appropriate Requirements for Revised Remedy

Standard, Requirement, Criteria or Limitation	Citation	Description	Comment
STATE (CONTINUED)			
Iowa Water Pollution Control Regulations	Iowa Code § 567 Chapter 38	Private water well construction permits.	Applicable for construction of new monitoring wells.
	Iowa Code § 567 Chapter 39	Well abandonment requirements.	Applicable if extraction or monitoring wells are abandoned.
	Iowa Code § 567 Chapter 40	Water supply definitions. Defines MCLs that Chapter 133 pertains to.	Not applicable or relevant and appropriate. Remedy will not affect drinking water supply.
	Iowa Code § 567 Chapter 49	These rules refer to nonpublic water wells, setting forth well construction standards, materials standards, and abandonment guidelines.	May be applicable to abandonment of private wells.
Water Withdrawals	Iowa Code § 567 Chapters 50-54	These rules address water withdrawal permits. Permits are required for withdrawals greater than 25,000 gallons per day.	Not applicable or relevant and appopriate since groundwater extraction system will be demolished.
	Iowa Code § 567 Chapter 82	Registration of water well contractors. Established certification and requirements for well contractors	Applicable for well drilling or abandonment. Monitoring well construction must be completed by a certified well driller.
Solid Waste Management and Disposal	Iowa Code § 567 Chapters 102, 103, 104, and 110	Permitting of solid waste processing and disposal facilities.	Not applicable or relevant and appropriate. This is not a solid waste processing or disposal facility.
Iowa Responsible Parties Cleanup Regulations	Iowa Code § 567 Chapter 133	These rules establish the procedures and criteria to determine the parties responsible and the cleanup actions necessary to meet the state's groundwater protection goals. These rules pertain to the cleanup of groundwater itself and to soils and surface water where groundwater may be impacted.	Applicable to constituents of concern in excess of State of Iowa Action Levels. Action levels are developed through MCLs or other Health-Based Standards.

TABLE 5
Amended Groundwater Cleanup Goals

Analyte	Existing Groundwater Cleanup Goals (ug/L) (a)	New Groundwater Cleanup Goals (ug/L)	TI Waiver Proposed?	Concentrations North of 21st Street (h)	Concentrations South of 21st Street (h)
Volatile Organic Compounds					
Benzene	1	5	Yes	ND - 1,700 ug/L	ND - 0.38 ug/L
1,2-Dichlorobenzene	600	600	No	ND - 8.8	ND
1,1-Dichloroethene	7	7	Yes	ND - 130	ND - 10
1,2-Dichloroethene (sum of cis and trans isomers)	70	-- (b)	Yes (b)	(b)	(b)
cis-1,2-Dichloroethene	--	70	Yes	ND - 1,400	ND - 120
trans-1,2-Dichloroethene	--	100	No	ND - 5.9	ND - 0.9
Ethylbenzene	700	700	No	ND - 140	ND - 0.3
Methylene Chloride	5	5	No (c)	(c)	(c)
Styrene	100	100	No	ND - 14	ND
1,1,2,2-Tetrachloroethane	0.2	-- (d)	No	(d)	(d)
Tetrachloroethene	5	5	Yes	ND - 4,700	ND - 1,000
Toluene	2,000	1,000	No	ND - 59	ND - 0.68
1,1,1-Trichloroethane	200	200	No	ND - 76	ND - 1.7
Trichloroethene	3	5	Yes	ND - 390	ND - 55
Vinyl Chloride	0.015	2	Yes	ND - 260	ND
Xylenes	10,000	10,000	No	ND - 80	ND - 1.99
Polynuclear Aromatic Hydrocarbons					
Benzo(a)pyrene	0.2	0.2	No (e)	(h)	(h)
Naphthalene	20	1.4	No (f)	(h)	(h)
Metals					
Antimony	3	6	No	(g)	(g)
Arsenic	0.03	10	No (g)	(g)	(g)
Barium	2,000	2,000	No	(g)	(g)

TABLE 5
Amended Groundwater Cleanup Goals

Notes to Table 5:

(a) Cleanup Standards are as shown in the Five Year Report for the Chemplex Site, dated 9 June 1999 and prepared by the Environmental Protection Agency, Region 7. The groundwater cleanup goals for the current remedy were established based on Chapter 133 of the Iowa Administrative Code, which became effective in 1989. These provisions set forth a hierarchical approach to set "action levels" that, if exceeded, would require identification of the nature and extent of a release. These action levels were not intended by the Iowa Department of Natural Resources to be established as cleanup levels. The hierarchy to select action levels was: (1) select the Lifetime Health Advisory Level (HAL), if one exists; (2) if no HAL exists, select the Negligible Cancer Risk Level (NRL); and (3) if no HAL or NRL exists, select the drinking water Maximum Contaminant Level (MCL). Under current regulatory practice in the State of Iowa, MCLs are now commonly applied for "protected" groundwater sources.

(b) The Consent Decree for the Chemplex First Operable Unit, dated September 1990, set forth a Groundwater Cleanup Standard of 70 micrograms per liter (ug/L) for total 1,2-Dichloroethene (Total 1,2-DCE) based on the then-current Health Advisory Level (HAL). This standard was established for the total of the cis and trans isomers because the analytical instruments at that time could not readily separate and report the two isomers individually. Because modern instruments can report the concentration of each isomer, and because both isomers now have Federal Drinking Water Maximum Contaminant Levels (MCLs), a Groundwater Cleanup Goal will be established for each isomer that is equal to its MCL. A cleanup goal for Total 1,2-DCE is thus no longer needed.

(c) Methylene chloride has been sporadically detected in Site groundwater analyses. These detections of methylene chloride, a common laboratory contaminant, in Chemplex groundwater are generally believed to result from laboratory contamination in view of repeated detections of this analyte in Site trip and field blanks. Methylene chloride will continue to be evaluated in the Chemplex groundwater monitoring network.

(d) 1,1,2,2-tetrachloroethane was not detected above the current cleanup standard, and therefore does not appear to be a chemical of concern at this Site. This analyte's cleanup standard will be deleted for this site.

(e) Benzo(a)pyrene is a polynuclear aromatic hydrocarbon (PAH) associated with historic releases of debutanized aromatic concentrate (DAC), a byproduct of ethylene production. As PAHs such as benzo(a)pyrene are generally less mobile in groundwater compared with volatile organic compounds (VOCs), their distribution at the Chemplex Site is not as widespread as PCE and its daughter products. Benzo(a)pyrene has occasionally been found in groundwater downgradient of the DAC management area of the polyethylene plant.

(f) Naphthalene is a PAH associated with historic releases of DAC and potentially with wastes disposed of in the Chemplex Landfill. The 1990 Consent Decree used the HAL for naphthalene, 20 ug/L, as a surrogate for establishment of cleanup standards for a number of non-carcinogenic PAHs. EPA has not has not established an MCL for naphthalene. EPA has now determined that naphthalene may be a carcinogen, and has set a concentration of 1.4 ug/L, equivalent to a risk level of one-in-one hundred thousand (10^{-5}), as a presumptive groundwater cleanup goal. As PAHs such as naphthalene are generally less mobile in groundwater compared with VOCs, their distribution at the Chemplex Site is not as widespread as PCE and its daughter products. Naphthalene has occasionally been found at levels below 20 ug/L but above 1.4 ug/L in groundwater immediately downgradient of the DAC Management Area. Naphthalene has also been occasionally detected above 1.4 ug/L in the far downgradient area of the Chemplex groundwater monitoring network. Given this analyte's limited mobility and the lack of a discernible naphthalene plume emanating from the plant area, it is not believed these far-downgradient detections result from past plant operations.

(g) Arsenic has been detected at the Chemplex Site at concentrations greater than the Proposed Groundwater Cleanup Goal. However, high background levels of arsenic are typical in Iowa. The Chemplex site is not a confirmed source of metals, including arsenic. Arsenic and other metals are no longer routinely sampled in Site groundwater.

TABLE 5
Amended Groundwater Cleanup Goals

Notes to Table 5 (continued):

(h) Reported concentration ranges for VOCs are taken from the April-May 2012 groundwater monitoring event. PAHs and metals were not analyzed in 2012.

Abbreviations:

HAL = Health Advisory Level
MCL = Maximum Contaminant Level
NRL = Negligible Risk Level
ug/L = micrograms per liter
ND = Non-detectable

TABLE 6

Comparative Analysis of 1989 OU-1 Remedy and Revised Remedy

		1989 OU-1 Remedy (Pump and Treat)	Revised Remedy (Exposure Control)
Threshold Criteria	**Overall Protection of Human Health and the Environment**	Remedy would not be protective of human health. Potential future exposure to PCE migrating downgradient may not be manageable by groundwater recovery, because impacted groundwater cannot be fully contained due to fractured bedrock. PCE that has migrated into the rock pores is back-diffusing into groundwater and is expected to continue to do so for several centuries. Under these conditions, neither extracting at a greater flowrate nor adding more wells would result in reliable capture. PCE concentrations in surface waters are not anticipated to be above levels of concern to potential ecological receptors.	Remedy would be protective of human health by providing a municipal water source to downgradient residents for domestic use, thereby preventing future exposure to potentially-contaminated groundwater via domestic use. Additional protectiveness would be provided by monitored natural attenuation, oxidant or electron donor application at localized "hot spots", and a program of institutional controls and monitoring. Based on a risk assessment performed as part of the July 2007 Final Focused Feasibility Study (FFFS), the risks to residents via the vapor intrusion scenario and the child wading in Rock Creek scenario are not expected to be significant. Based on the results of the Performance Test of this alternative as well as modeling performed as part of the feasibility studies, PCE concentrations are not expected to be above levels of concern for protection of ecological receptors.
	Compliance with ARARs	Remedy would not comply with drinking water MCLs because PCE has migrated, at levels of concern, outside of the existing Point of Compliance Boundary, and it is technically impracticable from an engineering perspective to restore groundwater PCE concentrations to drinking water MCLs under this remedy.	A monitoring program would keep track of VOC concentrations in groundwater within a Technical Impracticability Zone. Although certain ARARs, including selected MCLs, would be waived within this zone, Remedial Action Objectives for protectiveness of human and ecological receptors could be achieved.
Balancing Criteria	**Long-term Effectiveness and Permanence**	This remedy does not effectively, and on a long-term basis, prevent possible future migration of PCE-containing groundwater to achieve cleanup goals in the areas of non-attainment, due to the technical impracticability issues described in the UFFS.	Due to extension of the municipal water system westward along 9th Street and promulgation of a City well ordinance, residents connected to the municipal water system are permanently prevented from potential future exposure to PCE-containing groundwater.
	Reduction of Toxicity, Mobility, or Volume through Treatment	The OU-1 remedy included a groundwater extraction and treatment system. The extraction system reduced the volume of contaminants in the aquifer. The treatment system treated the extracted groundwater. Additional chemical mass beyond that provided by naturally-occurring biodegradation is removed by extracting a portion of the PCE that would otherwise leave the Point of Compliance boundary and migrate downgradient. In addition, as demonstrated during the Natural Attenuation Investigation (EKI, 1998), biodegradation is occurring in the West Region of the Site, with some limited potential for biodegradation in the East Region.	Reduction of localized "hot spot" VOC concentrations by oxidant or electron donor addition could reduce contaminant volume. Based on monitoring results to date, biodegradation is occurring in the West Region of the Site, with some limited potential for biodegradation in the East Region.

TABLE 6

Comparative Analysis of 1989 OU-1 Remedy and Revised Remedy

		1989 OU-1 Remedy (Pump and Treat)	Revised Remedy (Exposure Control)
Balancing Criteria	**Short-term Effectiveness**	Remedy is effective in the short term, as Site chemicals are not known to have reached private water supply wells at private residences at levels of concern.	Due to the extension of the municipal water system westward along 9th Street, coupled with the City well ordinance, residents connected to the municipal water system are protected against exposure to PCE-containing groundwater.
	Implementability	Remedy has already been implemented.	Alternative has been shown to be implementable through a performance test of the remedy from 2008 to present. The extension of the City municipal water system is already in place.
	Cost	$27,900,000 Total Present Value.	$18,600,000 Total Present Value.
Modifying Criteria	**State Acceptance**	Acceptable.	Acceptable.
	Community Acceptance	Acceptable, based on public information and meeting process.	Acceptable, based on public meeting and comments received on the Proposed Plan. See Appendix A, Responsiveness Summary.

Abbreviations:
MCLs = Maximum Contaminant Levels for drinking water
OU-1 = First Operable Unit for groundwater
OU-2 = Second Operable Unit for soil

Figures

N

0 2000 4000

(Approximate Scale in Feet)

Legend:

- Approximate Chemplex Site Boundary
- Assumed General Groundwater Gradient Direction
- Creek Flow Direction
- Estimated Source Zone

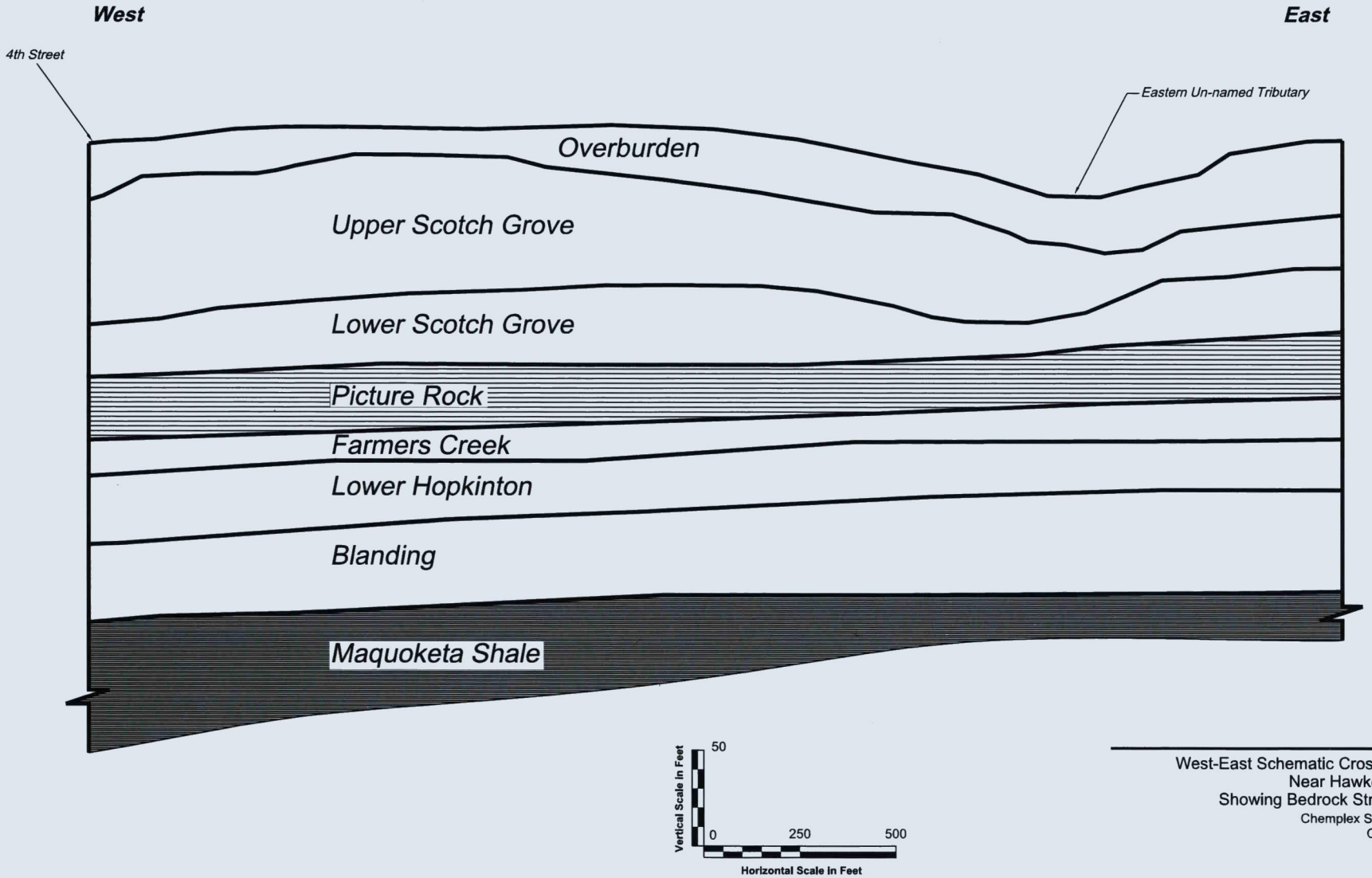
Notes:

1. Basemap source: USGS 7.5 minute series topographic map, Camanche Quadrangle, Iowa-Illinois, 1991.

Chemplex Site and Vicinity Map

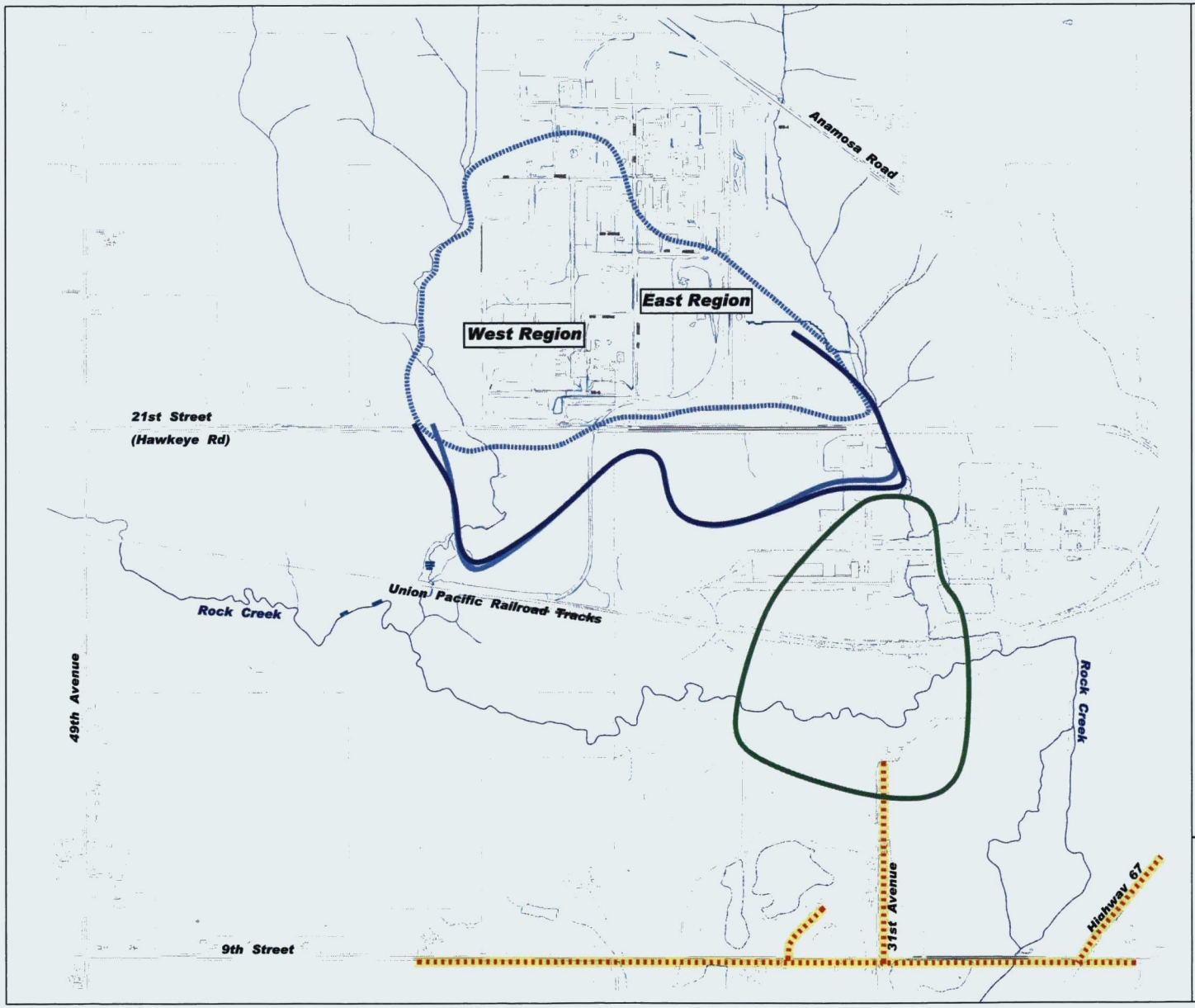
Chemplex Site
Clinton, Iowa
May 2012

Figure 1



West-East Schematic Cross Section
Near Hawkeye Road
Showing Bedrock Stratigraphy
Chemplex Site, First OU
Clinton, Iowa
May 2012

Figure 2



N

0 1000 2000

(Approximate Scale in Feet)

Legend:

- 1992 PCE Groundwater Plume Contour (10 ug/L)
- 2008 PCE Groundwater Plume Contour (5 ug/L)
- 2011 PCE Groundwater Plume Contour (5 ug/L)
- 2008 Nitrate in Groundwater Plume Contour (10 mg/L)
- Municipal Water System Extension

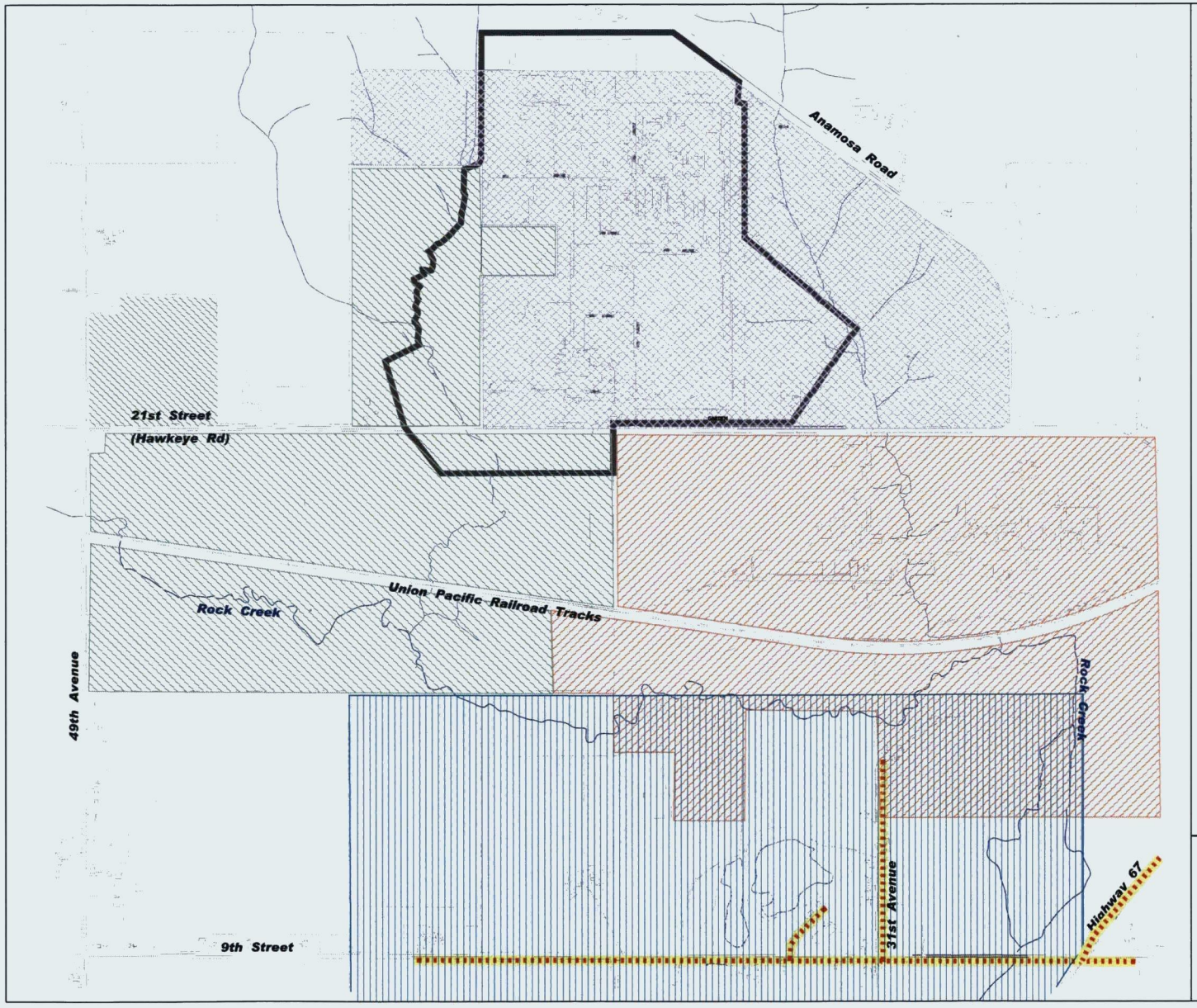
Notes:

1. The 2008 PCE concentration contour is based on data from April 2008, while the 2011 PCE concentration contour is based on data from November 2011.
2. The 1992 PCE concentration contour was based on concentrations reported in Montgomery Watson's *First Operable Unit Remedial Investigation Report*, dated August 1992.
3. The 2008 nitrate concentration contour was as reported in MACTECs *Report of Annual Monitoring and Remediation for 2008, PCS Nitrogen, Clinton, Iowa*, dated 25 March 2009.

Summary of PCE Plume in Groundwater Over Time

Chemplex Site, First OU
Clinton, Iowa
May 2012
EKI 890052.68

Figure 3



N

0 1000 2000

(Approximate Scale in Feet)

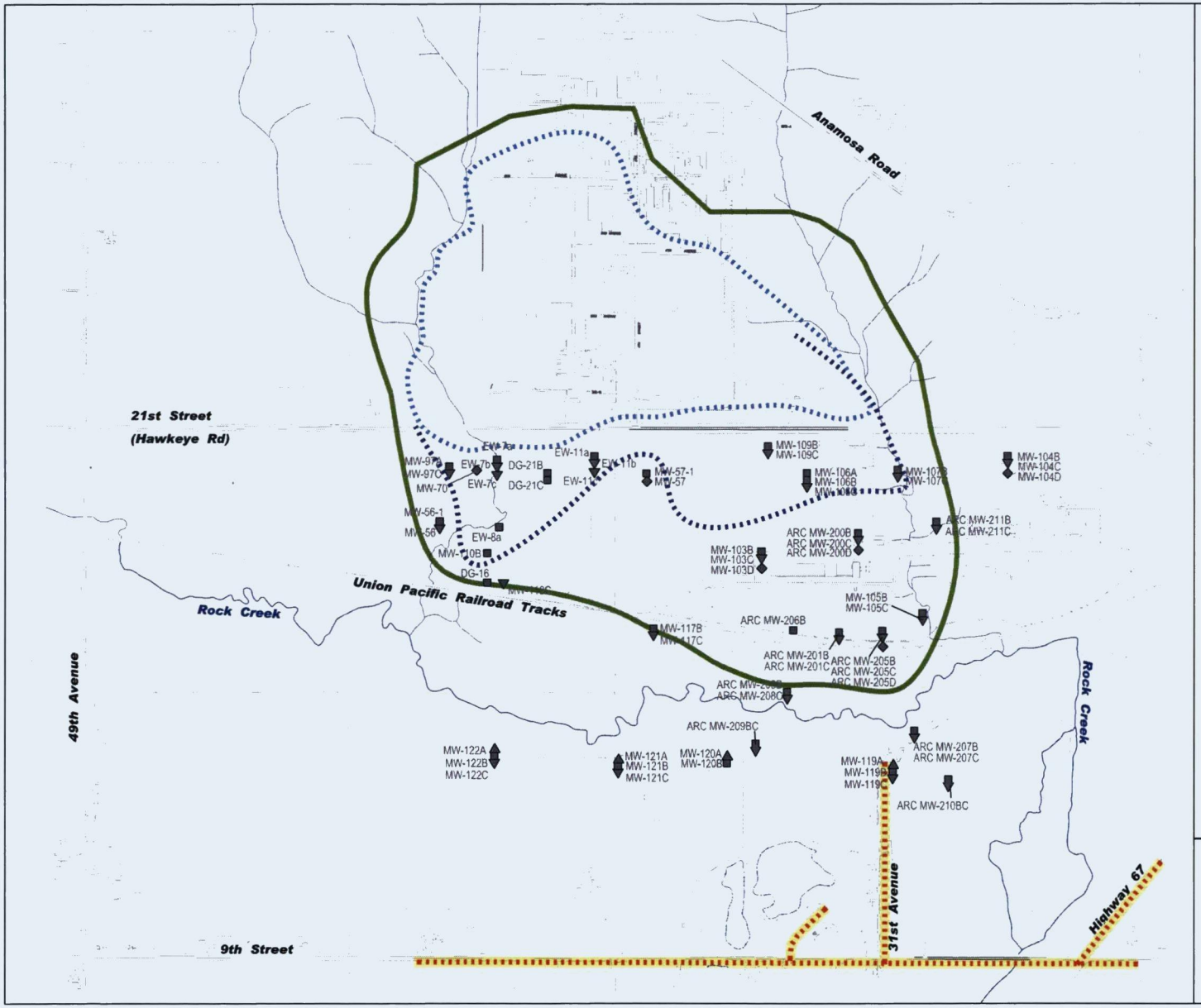
Legend:

- Current Point of Compliance Boundary
- Municipal Water System Extension
- Area of ACC/GCC Environmental Covenant
- Area of Equistar Environmental Covenant
- Area of Crossroads Environmental Covenant
- Area of Camanche Ordinance

Environmental Covenants and Ordinance Area Boundaries

Chemplex Site, First OU
Clinton, Iowa
May 2012

Figure 4



N

0 1000 2000

(Approximate Scale in Feet)

Legend:

- Municipal Water System Extension
- 2011 PCE Contour (5 ug/L)
- 1992 PCE Contour (10 ug/L)
- Proposed Technical Impracticability Zone Boundary

Monitoring Network Wells South of 21st Street:

- Scotch Grove Well
- Farmers Creek or Lower Hopkinton Well
- Well Screened in Both Scotch Grove and Farmers Creek
- Blanding Well

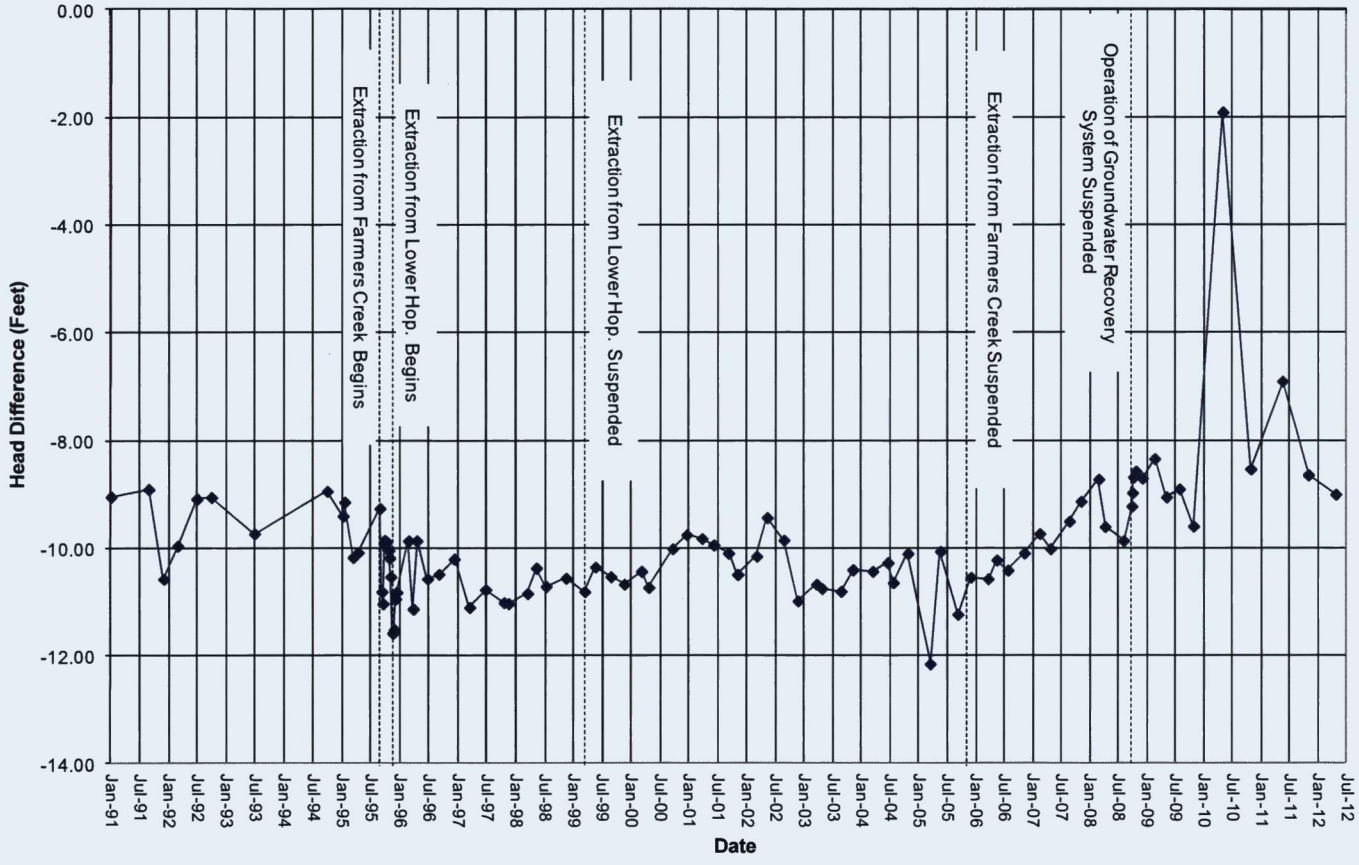
Notes:

1. For clarity purposes, only bedrock wells that are part of the 2011 monitoring program and are south of 21st Street are shown.

Technical Impacticability Zone Boundary

Chemplex Site, First OU
Clinton, Iowa
May 2012

Figure 5



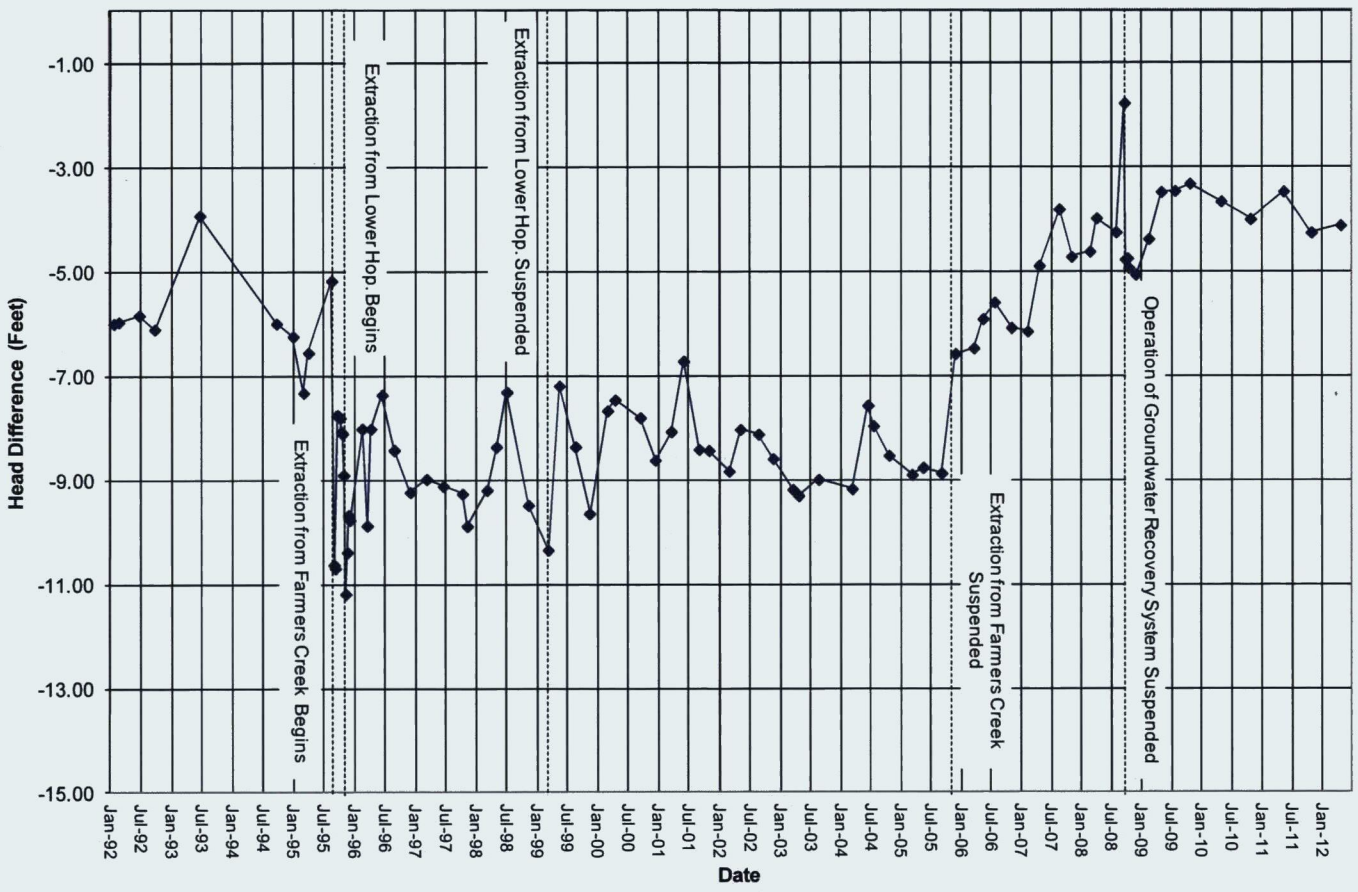
Notes:

1. Head difference shown is the difference between the groundwater elevation at Lower Scotch Grove well MW-65-1 and Blanding well MW-65. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Historic Head Difference in
East Region Monitoring Well Pair
MW-65-1/MW-65

Chemplex Site
Clinton, Iowa
July 2012

Figure 6



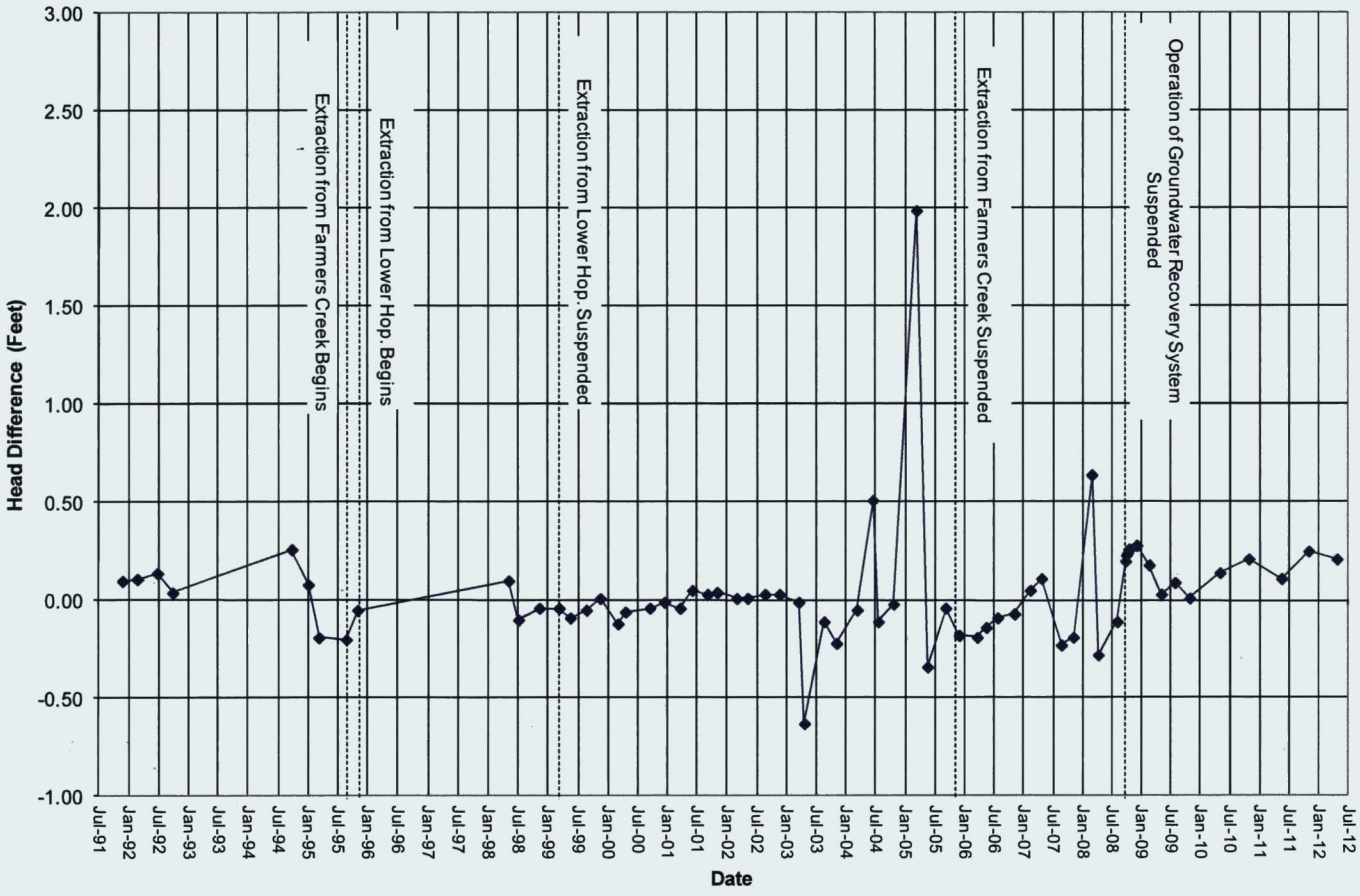
Notes:

1. Head difference shown is the difference between the groundwater elevation at Lower Scotch Grove well MW-83B and Farmers Creek well MW-83C. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Historic Head Difference in
East Region Monitoring Well Pair
MW-83B/MW-83C

Chemplex Site
Clinton, Iowa
July 2012

Figure 7



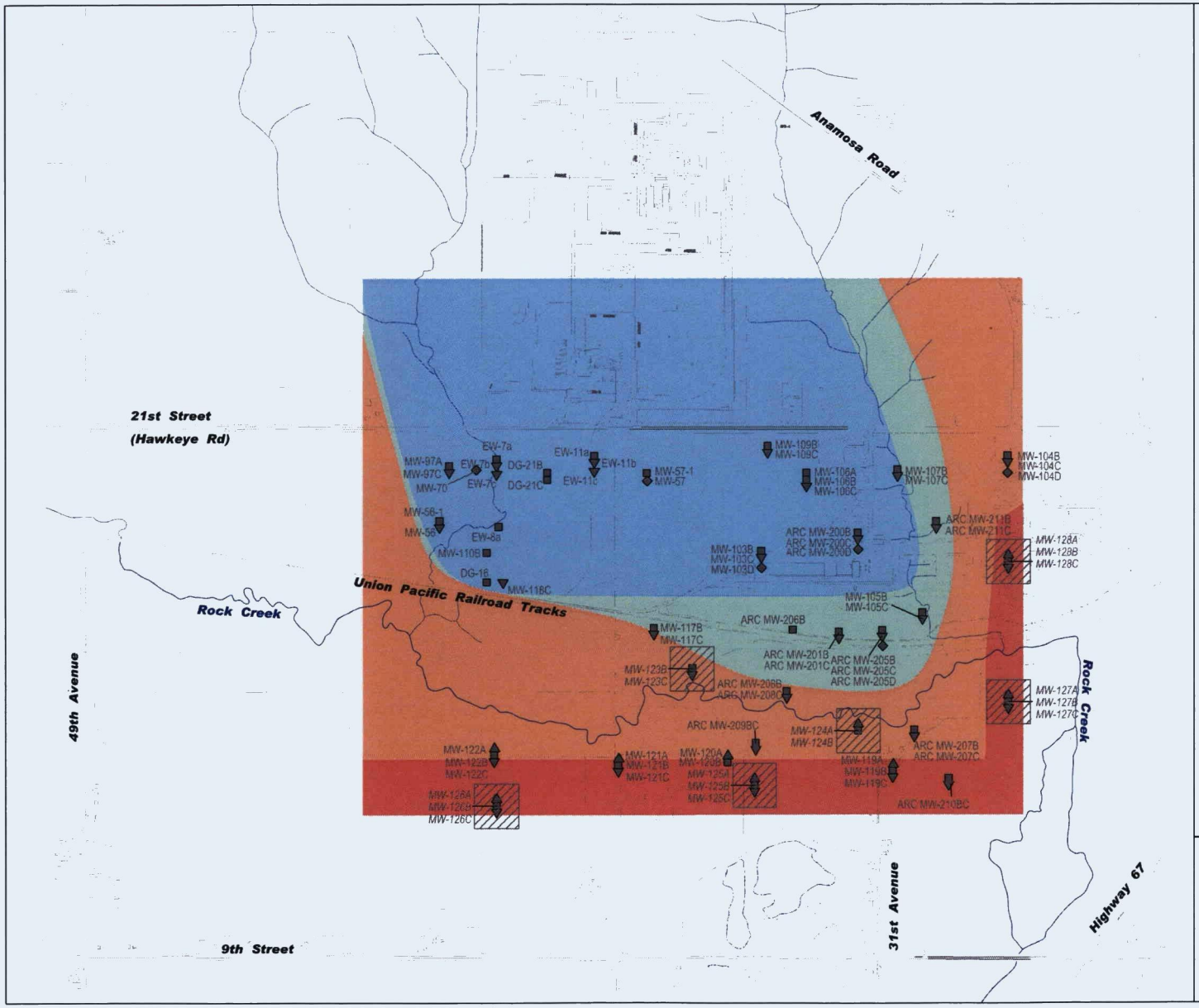
Notes:

1. Head difference shown is the difference between the groundwater elevation at Farmers Creek well MW-101C and Lower Hopkinton well MW-101D. A positive head difference indicates an upward vertical gradient, while a negative head difference indicates a downward vertical gradient.

Historic Head Difference in
West Region Monitoring Well Pair
MW-101C/MW-101D

Chemplex Site
Clinton, Iowa
July 2012

Figure 8



N

0 1000 2000

(Approximate Scale in Feet)

Legend:

- Routine Monitoring Zone
- Contingency Well Trigger Zone
- Heightened Awareness Zone
- Expedited Contingency Zone
- Potential Area for Contingency Well

Monitoring Network Wells South of 21st Street:

- Scotch Grove Well
- Farmers Creek or Lower Hopkinton Well
- Well Screened in Both Scotch Grove and Farmers Creek
- Blanding Well

Notes:

1. For clarity purposes, only bedrock wells that are part of the 2010 monitoring program and are south of 21st Street are shown.

Monitoring Zones and Contingency Wells

Chemplex Site, First OU
Clinton, Iowa
November 2012
EKI 890052.67
Figure 9

Appendix A

APPENDIX A

AMENDMENT TO THE RECORD OF DECISION

RESPONSIVENESS SUMMARY

CHEMPLEX SUPERFUND SITE
CLINTON, IOWA
OPERABLE UNIT NO. 1
IAD045372836

On February 17, 2012, the U.S. Environmental Protection Agency, Region 7, issued a Proposed Plan (Plan) for public review and comment. The Plan described the EPA's Preferred Alternative for addressing groundwater contamination at the Chemplex Superfund Site, Operable Unit No. 1, in Clinton, Iowa (the "Site"). Through the selection of this Preferred Alternative, the EPA will be amending the remedy that it selected in the Record of Decision (ROD) for Operable Unit No. 1 issued on September 27, 1989 (the "1989 ROD"), as modified through an Explanation of Significant Differences issued by the EPA on July 26, 1991. This revision to the remedy will take the form of an Amendment to the Record of Decision (ROD Amendment).

A notice informing the public of the issuance of the Plan, as well as the date and time of the public meeting, was published in the *Clinton Herald*, a major local newspaper of general circulation, on February 17, 2012. Public Comments on the Plan were accepted through March 19, 2012. A public meeting on the Plan was held in Camanche, Iowa on February 27, 2012. Relevant documents pertaining to the Plan were available for public review at the EPA Records Center in Kansas City, Kansas and at the local Camanche Public Library prior to the public meeting. These documents remain available at public repositories as they are part of the Administrative Record file for the Site.

Comments Received and the EPA's Responses

The EPA received comments from one local resident. The commenter presented the comment at the public meeting and then submitted an e-mail to the EPA with an attached letter containing a similar but more detailed comment. The letter detailing the comment is included in the Administrative Record for the Site as Document No. 30245038. The following are summaries of the comments followed by the EPA's responses in italics.

1. The commenter asserted that the Updated Focused Feasibility Study (the "2012 UFFS") and the EPA's Fact Sheets stated that the revised remedy included "enhanced groundwater and surface water monitoring" but at the February 27, 2012 meeting, the EPA stated that the surface water monitoring would be the same as that required in the original Record of Decision (ROD). The commenter stated that "[t]o sum up my concerns, I feel that the Source Polluters should be required, as a condition of the amended ROD, to annually test the surface waters downgradient of the massive toxic chemical plume . . . ."

The amended ROD does require more surface water sampling than the original, 1989 ROD. The general sampling requirements for the 1989 ROD are set forth in the August 13, 1991, Consent Decree Statement of Work (SOW). The specific surface water and groundwater requirements of the SOW are set forth in the November 1993 Performance Monitoring Evaluation (PME) Plan. The PME Plan requires that surface water samples be collected annually from one location in the west tributary to Rock Creek. While the revised remedy includes sampling at this original location in the west tributary, it also requires sampling at three additional locations, one in the east tributary and two in Rock Creek. While the responsible parties have been sampling these locations voluntarily, the sampling of all of these locations was not a requirement of the 1989 ROD or 1991 Consent Decree. The revised remedy requires the sampling of all four of these locations on a semiannual (twice yearly) rather than annual basis. So the number of surface locations required to be sampled has increased from one to four and the sampling has increased from annually to twice a year.

In addition, the revised remedy presents contingency measures that must be taken by the responsible parties if certain trigger levels of contaminants are met or exceeded in surface waters. There are three contingency levels that may be triggered if Site contaminants increase within four groundwater monitoring zones. These triggers may require that additional monitoring and potentially, additional remedial responses, be conducted to mitigate any threats to human health and the environment. The monitoring zones and contingency measures are set forth in section 4.7.2.5 of the 2012 UFFS.

2. The commenter expressed concern about the following statement in a December 23, 2008 letter, from Mark Hendrickson of Chevron to Nancy Swyers of the EPA, "ACC/GCC remains concerned about the potential, however unlikely, of future exposure resulting from continued use of these wells." The commenter went on to say that the EPA can't state with 100% certainty that no hazardous substances from the Site will reach any surface water in the Camanche west district "since all cleanup efforts will be abandoned."

The EPA has determined that the contaminant plume has been stable since the groundwater extraction and treatment system was shut off in 2008. The continued stability of the plume will be monitored by the expanded groundwater and surface water monitoring program required as part of the revised remedy. A total of 15 new monitoring wells have been installed downgradient of the Site. These wells will be monitored as part of the revised remedy and the responsible parties will be required to ensure that the plume remains stable.

In addition to the expanded monitoring, the revised remedy provides for "hot spot" treatment of areas where there are elevated levels of contamination. Pilot tests conducted by the responsible parties in 2009 indicated that this "hot spot" treatment, through the use of a strong oxidant or an electron donor, was effective in remediating local hot spots with elevated PCE concentrations in the groundwater. The active remediation component of the revised remedy is discussed in detail in section 4.7.2.2 of the 2012 UFFS.

3. The commenter expressed concern about the contaminants being in fractured bedrock and that nobody can predict the exact path of contaminant movement.

   The commenter is correct that the exact future path of contaminant movement in the fractured bedrock cannot be predicted. However, as the EPA's senior hydrogeologist explained at the February 27, 2012 public meeting, it is known that the Scotch Grove formation, which is the upper fractured bedrock geological formation at the Site, discharges into Rock Creek, which is upgradient of the surface water bodies identified by the commenter. Therefore, contaminants will appear in Rock Creek before they will appear in the downgradient surface waters. As monitoring of Rock Creek is a requirement of the revised remedy, the EPA expects that Site contaminants will be detected in Rock Creek before the contaminants would ever appear in any surface waters located downgradient of Rock Creek.

4. The commenter expressed concern about the EPA being able to verify that the Remedial Action Objectives (RAOs) for surface water are being maintained without testing of the surface water.

   As stated in response to comment number 3 above, the EPA expects that the sampling of Rock Creek and its tributaries, as required by the revised remedy, will be adequate to verify surface water RAOs. Although there have been some detections of Site contaminants in Rock Creek and its tributaries, these detections have been well below levels that may result in any adverse effects in human health or the environment. Accordingly, the EPA considers the RAOs for surface water, as set forth in the 1989 ROD, to have been consistently achieved for the Site.[1] The EPA also expects that the revised remedy will consistently achieve the RAOs for surface water as set forth in section 4.5 of the 2012 ROD Amendment.

5. The commenter stated that the request for surface water monitoring has widespread support. Local residents of Camanche as well as elected representatives and the Izaak Walton League of America have requested that the surface water testing of the local lakes.

   The EPA has received and responded to letters from all of these entities. The EPA tested the Murphy Lake in 2010 and 2011. The EPA also tested the Foley Lake in 2011. As expected, no Site-related contaminants were detected at either location. Although the EPA appreciates the concern that the public has for the water quality of the surface waters, the EPA must make technical and scientific decisions for sites based on evidence and the best judgment of its professionals. It is the EPA's judgment, as discussed above, that the additional sampling is unnecessary and would not enhance the protectiveness of the revised remedy.

6. The commenter expressed concern that the EPA proposed the revised remedy in the Plan because it is cost-effective, not because it is the "right thing to do."

   Prior to proposing the revised remedy for the Site, the EPA researched the possibility of implementing other remedies. The EPA looked into innovative technologies that had been implemented at other sites. It is the EPA's judgment that those remedies would not be effective at the Site due to the presence of dense non-aqueous phase liquid (DNAPL) contamination in fractured bedrock. This DNAPL contamination has reached at least one hundred feet below

[1] The remedial action objectives for surface water under the 1989 ROD are the prevention of adverse effects to human health and environmental receptors from Site contaminants in surface waters (see sections 1.6.B, 1.6.C, and 5.1 of the 1989 ROD).

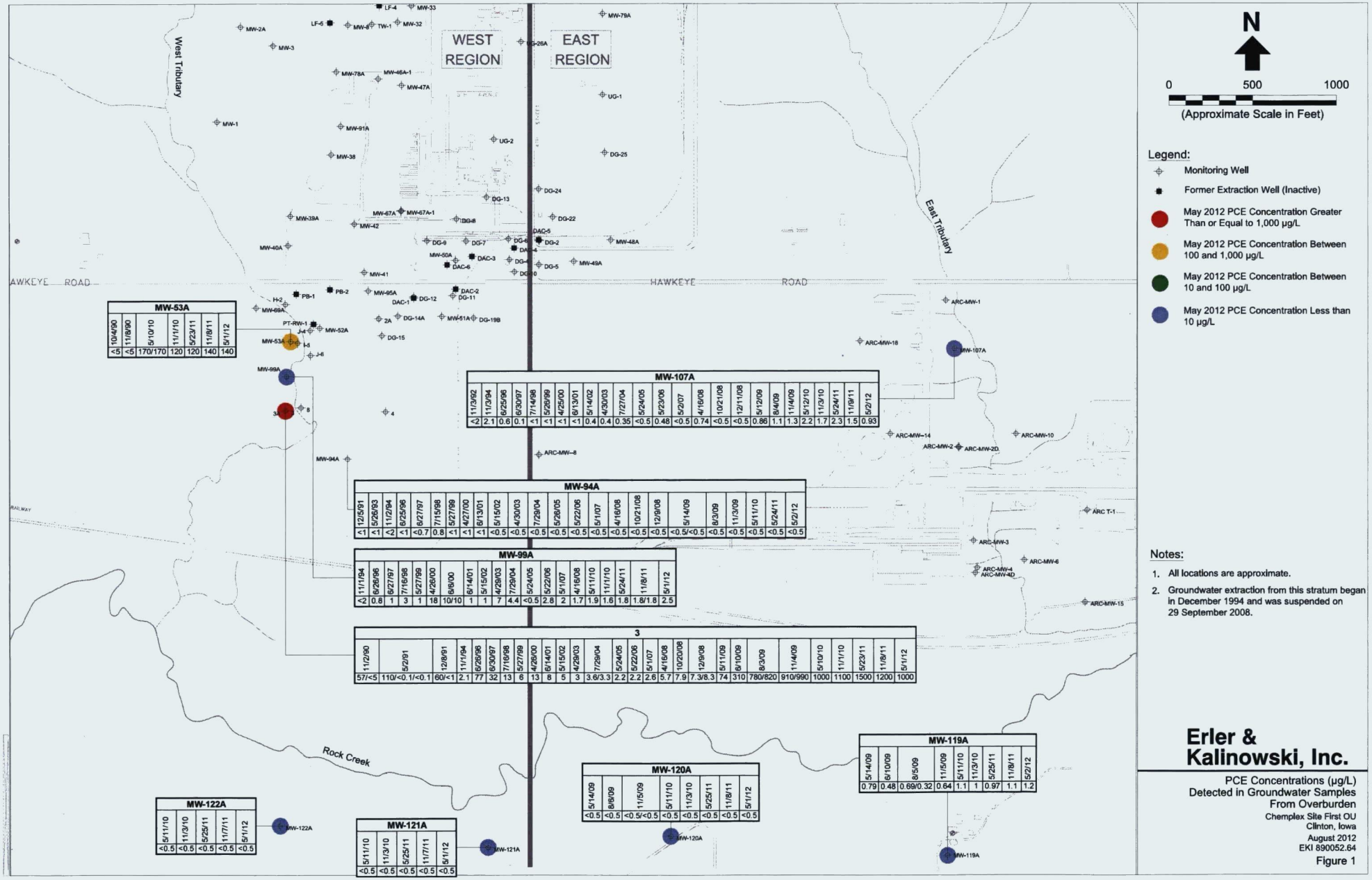
ground surface and reached steady state conditions decades ago. If the EPA disturbs this contamination, it will make the contamination more mobile. In some regards, the groundwater extraction and treatment that was implemented as part of the 1989 ROD deepened and spread out the contaminant plume. The EPA believes that the revised remedy should be implemented because it is the best available alternative for the Site. Cost effectiveness is one of the nine criteria that the EPA is required to consider when selecting a remedy for a site. The EPA believes that the remedy satisfies the other eight criteria as well as cost effectiveness.

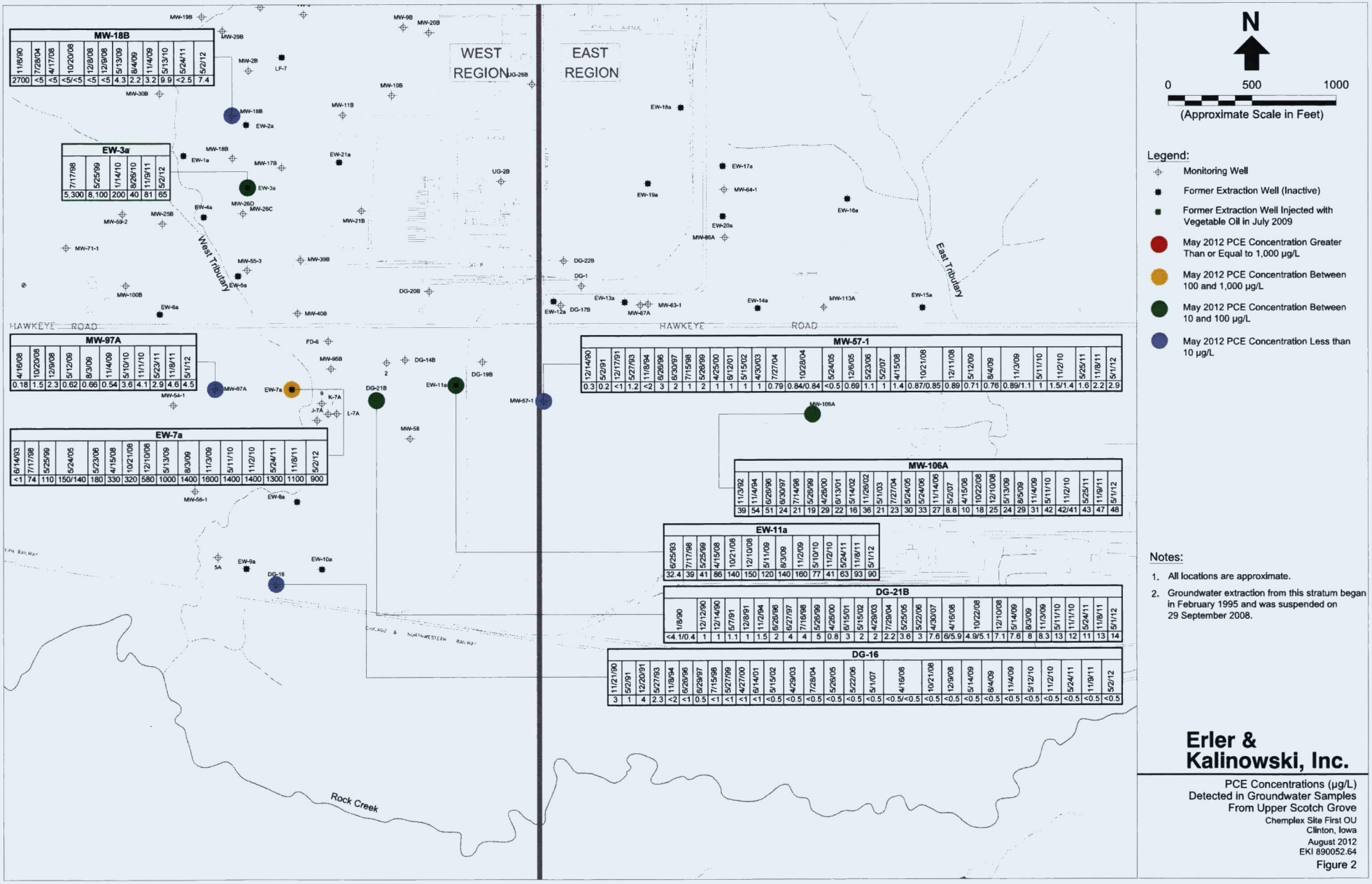
7. The commenter concluded his comments with the following:

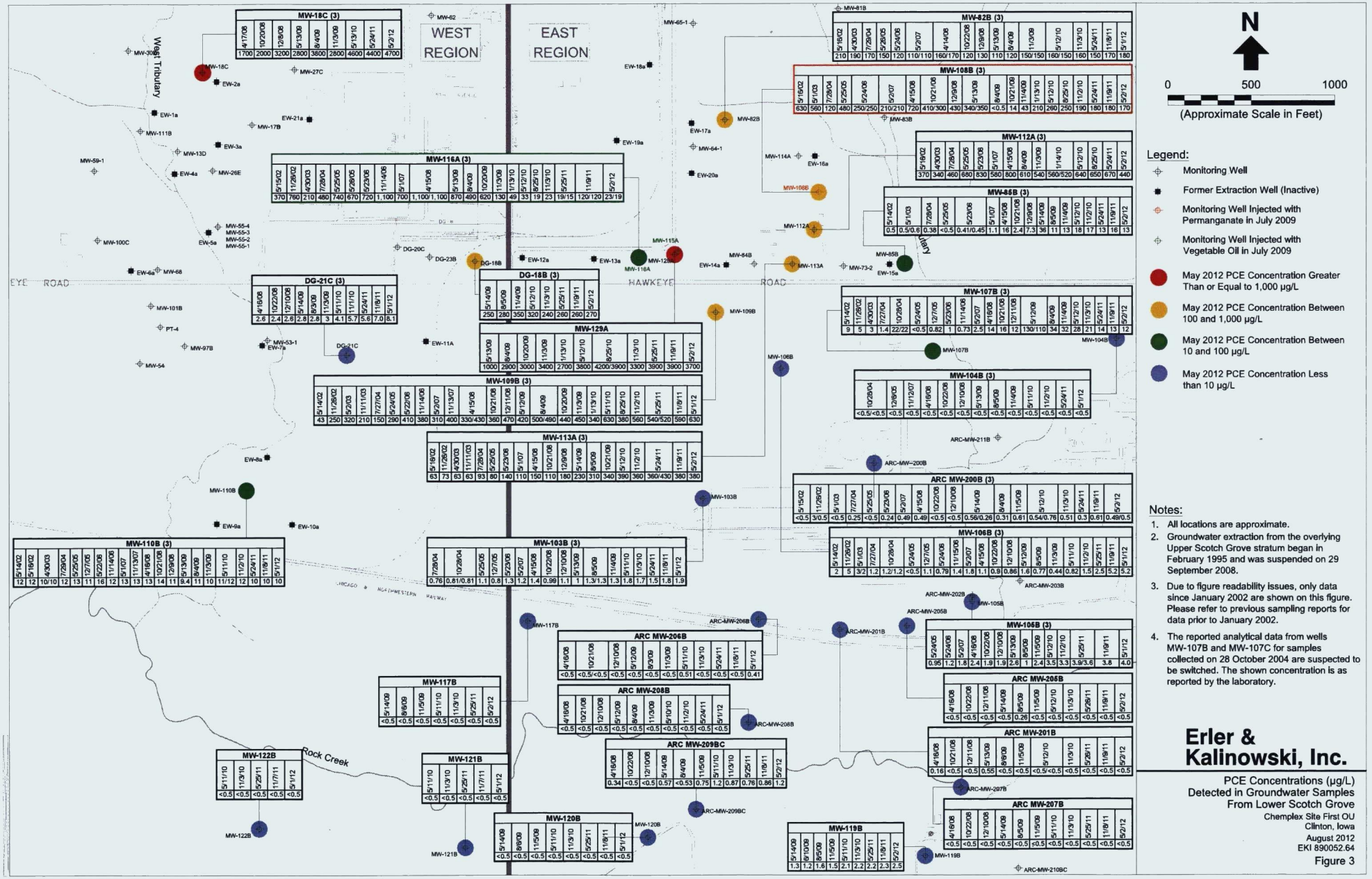
OFFICIAL REQUEST TO THE EPA CONCERNING THE CHEMPLEX SUPERFUND SITE: to include as a requirement in an amended Record of Decision, annual surface water testing by an Independent Laboratory for all chemicals of concern for the surface water downgradient of the Chemplex Superfund Site. Testing would include Cross' Marsh, Foley's Lake, Bark's Lakes (both), Murphy's Lake and Rock Creek south of the 9th Street Bridge. Annual test results are to be provided to the Lake owners as well as the Attorney for the city of Camanche and the Attorney for Clinton County.

As indicated in the responses to comments above, it is the EPA's judgment, and the state of Iowa concurs, that annual surface water sampling of the local lakes or additional locations in Rock Creek would not enhance the protectiveness of the revised remedy. The EPA believes that the current groundwater and surface water monitoring network are sufficient to ensure that the groundwater contaminant plume does not migrate to the surface water bodies identified by the commenter. Extensive groundwater and surface water monitoring has demonstrated the stability of the plume. In the unlikely event that the contaminant plume would migrate unexpectedly, contingency measures would be available (see response to question number 2 above) to ensure that further remedial actions would be implemented and that the RAOs continue to be achieved.

Appendix B


WEST REGION
EAST REGION
West Tributary
East Tributary
Rock Creek
HAWKEYE ROAD
HAWKEYE ROAD
RAILWAY
MW-53A
10/4/90 11/8/90 5/10/10 11/1/10 5/23/11 11/8/11 5/1/12
<5 <5 170/170 120 120 140 140
MW-107A
11/3/92 11/3/94 6/25/96 6/30/97 7/14/98 5/26/99 4/25/00 6/13/01 5/14/02 4/30/03 7/27/04 5/24/05 5/23/06 5/2/07 4/16/08 10/21/08 12/11/08 5/12/09 8/4/09 11/4/09 5/12/10 11/3/10 5/24/11 11/9/11 5/2/12
<2 2.1 0.6 0.1 <1 <1 <1 <1 0.4 0.4 0.35 <0.5 0.48 <0.5 0.74 <0.5 <0.5 0.86 1.1 1.3 2.2 1.7 2.3 1.5 0.93
MW-94A
12/5/91 5/26/93 11/2/94 6/25/96 6/27/97 7/15/98 5/27/99 4/27/00 6/13/01 5/15/02 4/30/03 7/29/04 5/26/05 5/22/06 5/1/07 4/16/08 10/21/08 12/9/08 5/14/09 8/3/09 11/3/09 5/11/10 5/24/11 5/2/12
<1 <1 <2 <1 <0.7 0.8 <1 <1 <1 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5
MW-99A
11/1/94 6/26/96 6/27/97 7/19/98 5/27/99 4/26/00 6/6/00 6/14/01 5/15/02 4/29/03 7/29/04 5/24/05 5/22/06 5/1/07 4/16/08 5/11/10 11/1/10 5/24/11 11/8/11 5/1/12
<2 0.8 1 3 1 18 10/10 1 1 7 4.4 <0.5 2.8 2 1.7 1.9 1.6 1.8 1.8/1.8 2.5
3
11/2/90 9/2/91 12/8/91 11/1/94 9/26/96 6/30/97 7/16/98 5/27/99 4/26/00 6/14/01 5/15/02 4/29/03 7/29/04 5/24/05 5/22/06 5/1/07 4/16/08 10/20/08 12/9/08 5/11/09 8/10/09 8/3/09 11/4/09 5/10/10 11/1/10 5/23/11 11/8/11 5/1/12
57/<5 110/<0.1/<0.1 60/<1 2.1 77 32 13 6 13 8 5 3 3.6/3.3 2.2 2.2 2.6 5.7 7.9 7.3/8.3 74 310 780/820 910/990 1000 1100 1500 1200 1000
MW-119A
5/14/09 8/10/09 8/5/09 11/5/09 5/11/10 11/3/10 5/25/11 11/8/11 5/2/12
0.79 0.48 0.69/0.32 0.64 1.1 1 0.97 1.1 1.2
MW-120A
5/14/09 8/5/09 11/5/09 5/11/10 11/3/10 5/25/11 11/8/11 5/1/12
<0.5 <0.5 <0.5/<0.5 <0.5 <0.5 <0.5 <0.5 <0.5
MW-122A
5/11/10 11/3/10 5/25/11 11/7/11 5/1/12
<0.5 <0.5 <0.5 <0.5 <0.5
MW-121A
5/11/10 11/3/10 5/25/11 11/7/11 5/1/12
<0.5 <0.5 <0.5 <0.5 <0.5
N
0 500 1000
(Approximate Scale in Feet)
Legend:
Monitoring Well
Former Extraction Well (Inactive)
May 2012 PCE Concentration Greater Than or Equal to 1,000 µg/L
May 2012 PCE Concentration Between 100 and 1,000 µg/L
May 2012 PCE Concentration Between 10 and 100 µg/L
May 2012 PCE Concentration Less than 10 µg/L
Notes:
1. All locations are approximate.
2. Groundwater extraction from this stratum began in December 1994 and was suspended on 29 September 2008.
Erler & Kalinowski, Inc.
PCE Concentrations (µg/L) Detected in Groundwater Samples From Overburden
Chemplex Site First OU
Clinton, Iowa
August 2012
EKI 890052.64
Figure 1


WEST REGION
EAST REGION
HAWKEYE ROAD
West Tributary
East Tributary
Rock Creek
CHICAGO & NORTHWESTERN RAILWAY
MW-18B
11/8/90 | 2700
7/28/04 | <5
4/17/08 | <5
10/20/08 | <5/<5
12/8/08 | <5
12/9/08 | <5
5/13/09 | 4.3
8/4/09 | 2.2
11/4/09 | 3.2
5/13/10 | 9.9
5/24/11 | <2.5
5/2/12 | 7.4
EW-3a
7/7/17/98 | 5,300
5/25/99 | 8,100
1/14/10 | 200
8/26/10 | 40
11/9/11 | 81
5/2/12 | 65
MW-97A
4/16/08 | 0.18
10/20/08 | 1.5
12/9/08 | 2.3
5/12/09 | 0.62
8/3/09 | 0.66
11/4/09 | 0.54
5/10/10 | 3.6
11/1/10 | 4.1
5/23/11 | 2.9
11/8/11 | 4.6
5/1/12 | 4.5
EW-7a
6/14/93 | <1
7/17/98 | 74
5/25/99 | 110
5/24/05 | 150/140
5/23/06 | 180
4/15/08 | 330
10/21/08 | 320
12/10/08 | 580
5/13/09 | 1000
8/3/09 | 1400
11/3/09 | 1600
5/11/10 | 1400
11/2/10 | 1400
5/24/11 | 1300
11/8/11 | 1100
5/2/12 | 900
MW-57-1
12/14/90 | 0.3
5/2/91 | 0.2
12/17/91 | <1
5/27/93 | 1.2
11/8/94 | <2
6/26/96 | 3
6/30/97 | 2
7/15/98 | 1
5/26/99 | 2
4/25/00 | 1
6/12/01 | <1
5/15/02 | <1
4/30/03 | 1
7/27/04 | 0.79
10/28/04 | 0.84/0.84
5/24/05 | <0.5
12/6/05 | 0.69
5/23/06 | 1.1
5/2/07 | 1
4/15/08 | 1.4
10/21/08 | 0.87/0.85
12/11/08 | 0.89
5/12/09 | 0.71
8/4/09 | 0.76
11/3/09 | 0.89/1.1
5/11/10 | 1
11/2/10 | 1.5/1.4
5/25/11 | 1.6
11/8/11 | 2.2
5/1/12 | 2.9
MW-106A
11/3/92 | 39
11/4/94 | 54
6/26/96 | 51
6/30/97 | 24
7/14/98 | 21
5/26/99 | 19
4/26/00 | 29
6/13/01 | 22
5/14/02 | 16
11/26/02 | 36
5/1/03 | 21
7/27/04 | 23
5/24/05 | 30
11/14/06 | 33
5/2/07 | 27
4/15/08 | 8.8
10/22/08 | 10
12/10/08 | 18
5/13/09 | 25
8/5/09 | 24
11/4/09 | 29
5/11/10 | 31
11/2/10 | 42
5/25/11 | 42/41
11/8/11 | 43
5/1/12 | 47
48
EW-11a
6/25/93 | 32.4
7/17/98 | 39
5/25/99 | 41
4/15/08 | 86
10/21/08 | 140
12/10/08 | 150
5/11/09 | 120
8/3/09 | 140
11/2/09 | 160
5/10/10 | 77
11/2/10 | 41
5/24/11 | 63
11/8/11 | 93
5/1/12 | 90
DG-21B
11/8/90 | <4.1/0.4
12/12/90 | 1
12/14/90 | 1
5/7/91 | 1.1
12/8/91 | 1
11/2/94 | 1.5
6/26/96 | 2
6/27/97 | 4
7/16/98 | 4
5/26/99 | 5
4/28/00 | 0.8
6/15/01 | 3
5/15/02 | 2
4/29/03 | 2
7/29/04 | 2.2
5/25/05 | 3.6
5/22/06 | 3
4/30/07 | 7.6
4/16/08 | 6/5.9
10/22/08 | 4.9/5.1
12/10/08 | 7.1
5/14/09 | 7.6
8/3/09 | 8
11/3/09 | 8.3
5/11/10 | 13
11/1/10 | 12
5/24/11 | 11
11/8/11 | 13
5/1/12 | 14
DG-16
11/21/90 | 3
5/2/91 | 1
12/20/91 | 4
5/27/93 | 2.3
11/8/94 | <2
6/26/96 | <1
6/29/97 | 0.5
7/15/98 | <1
5/27/99 | <1
4/27/00 | <1
6/14/01 | <1
5/15/02 | <0.5
4/29/03 | <0.5
7/28/04 | <0.5
5/26/05 | <0.5
5/22/06 | <0.5
5/1/07 | <0.5
4/16/08 | <0.5/<0.5
10/21/08 | <0.5
12/9/08 | <0.5
5/14/09 | <0.5
8/4/09 | <0.5
11/4/09 | <0.5
5/12/10 | <0.5
11/2/10 | <0.5
5/24/11 | <0.5
11/8/11 | <0.5
5/2/12 | <0.5
N
0
500
1000
(Approximate Scale in Feet)
Legend:
Monitoring Well
Former Extraction Well (Inactive)
Former Extraction Well Injected with Vegetable Oil in July 2009
May 2012 PCE Concentration Greater Than or Equal to 1,000 µg/L
May 2012 PCE Concentration Between 100 and 1,000 µg/L
May 2012 PCE Concentration Between 10 and 100 µg/L
May 2012 PCE Concentration Less than 10 µg/L
Notes:
1. All locations are approximate.
2. Groundwater extraction from this stratum began in February 1995 and was suspended on 29 September 2008.
Erler & Kalinowski, Inc.
PCE Concentrations (µg/L) Detected in Groundwater Samples From Upper Scotch Grove
Chemplex Site First OU
Clinton, Iowa
August 2012
EKI 890052.64
Figure 2



Legend:

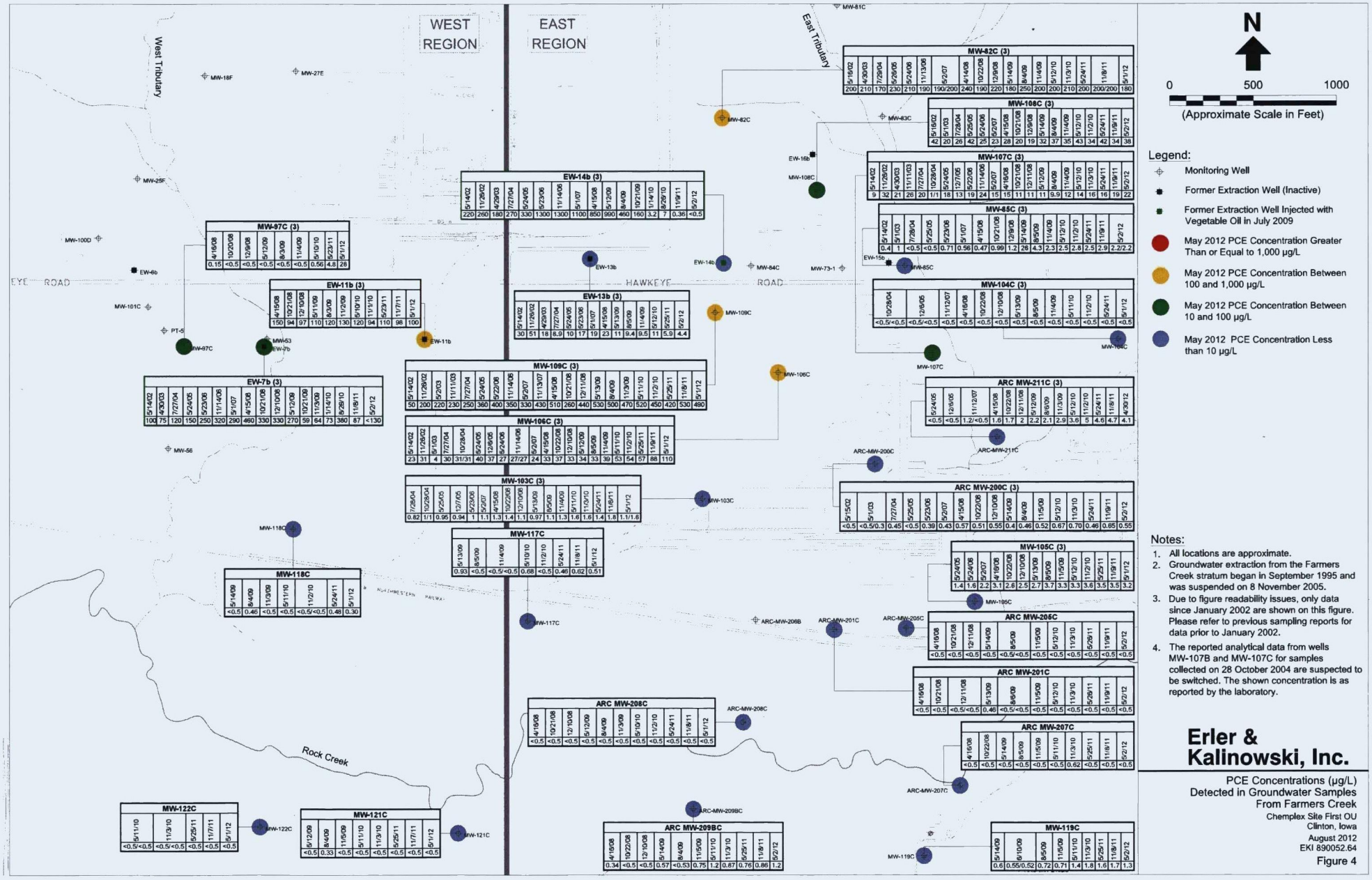
- Monitoring Well
- Former Extraction Well (Inactive)
- Monitoring Well Injected with Permanganate in July 2009
- Monitoring Well Injected with Vegetable Oil in July 2009
- May 2012 PCE Concentration Greater Than or Equal to 1,000 µg/L
- May 2012 PCE Concentration Between 100 and 1,000 µg/L
- May 2012 PCE Concentration Between 10 and 100 µg/L
- May 2012 PCE Concentration Less than 10 µg/L

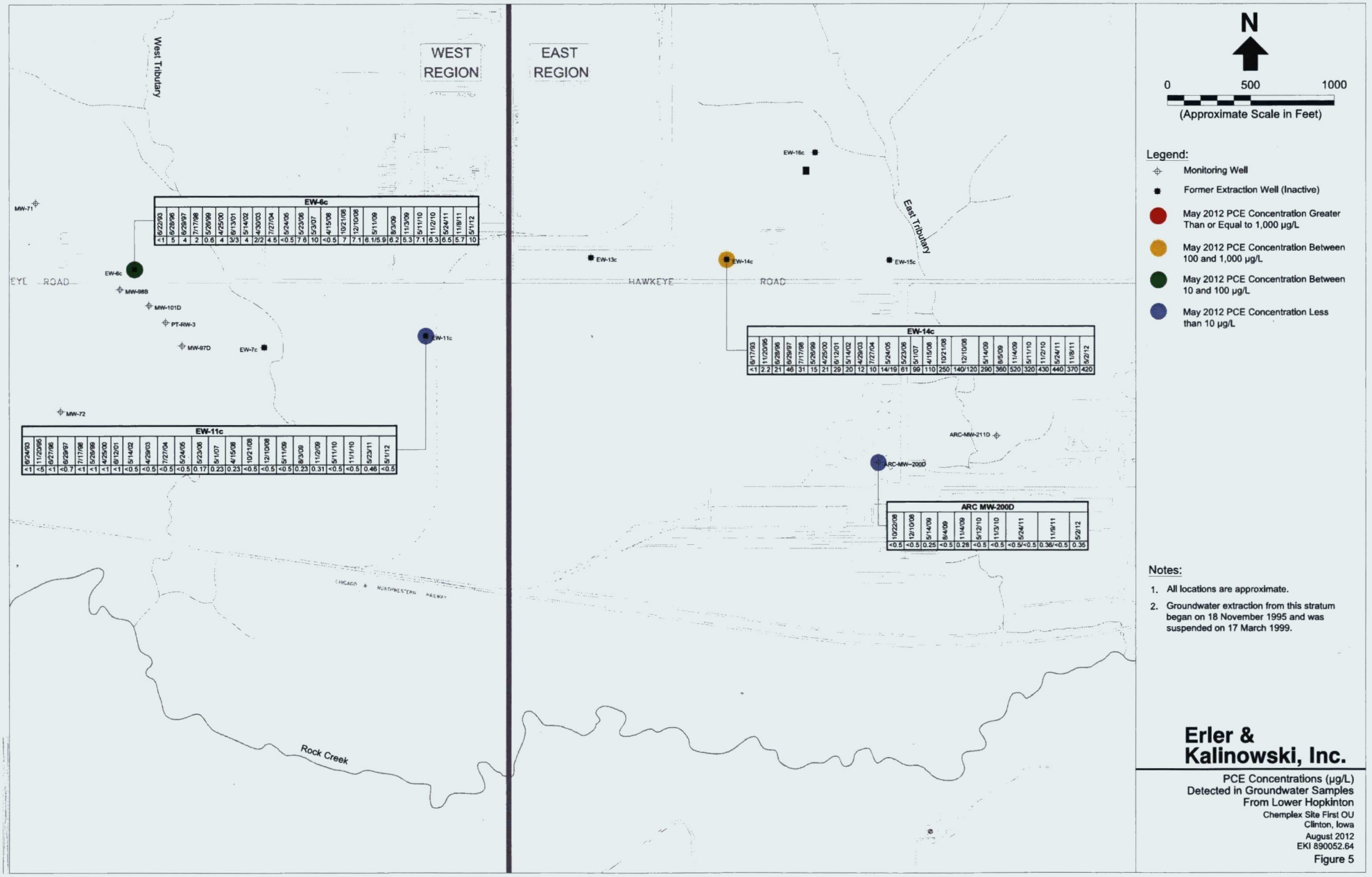
Notes:

1. All locations are approximate.
2. Groundwater extraction from the overlying Upper Scotch Grove stratum began in February 1995 and was suspended on 29 September 2008.
3. Due to figure readability issues, only data since January 2002 are shown on this figure. Please refer to previous sampling reports for data prior to January 2002.
4. The reported analytical data from wells MW-107B and MW-107C for samples collected on 28 October 2004 are suspected to be switched. The shown concentration is as reported by the laboratory.

Erler & Kalinowski, Inc.

PCE Concentrations (µg/L)
Detected in Groundwater Samples
From Lower Scotch Grove
Chemplex Site First OU
Clinton, Iowa
August 2012
EKI 890052.64
Figure 3


WEST REGION
EAST REGION
West Tributary
East Tributary
Rock Creek
HAWKEYE ROAD
EYE ROAD
MW-18F
MW-27E
MW-25F
MW-100D
EW-6b
PT-5
MW-101C
MW-97C
MW-53
EW-7b
EW-11b
MW-56
MW-118C
MW-122C
MW-121C
EW-13b
EW-14b
MW-84C
MW-73-1
MW-85C
MW-109C
MW-106C
MW-107C
MW-104C
MW-103C
MW-117C
MW-105C
MW-82C
MW-83C
EW-16b
MW-108C
EW-15b
ARC-MW-200C
ARC-MW-211C
ARC-MW-206B
ARC-MW-201C
ARC-MW-205C
ARC-MW-208C
ARC-MW-207C
ARC-MW-209BC
MW-119C
MW-97C (3)
EW-11b (3)
EW-7b (3)
EW-14b (3)
EW-13b (3)
MW-109C (3)
MW-106C (3)
MW-103C (3)
MW-117C
MW-118C
MW-122C
MW-121C
MW-82C (3)
MW-108C (3)
MW-107C (3)
MW-85C (3)
MW-104C (3)
ARC MW-211C (3)
ARC MW-200C (3)
MW-105C (3)
ARC MW-205C
ARC MW-201C
ARC MW-208C
ARC MW-207C
ARC MW-209BC
MW-119C
N
0
500
1000
(Approximate Scale in Feet)
Legend:
Monitoring Well
Former Extraction Well (Inactive)
Former Extraction Well Injected with Vegetable Oil in July 2009
May 2012 PCE Concentration Greater Than or Equal to 1,000 µg/L
May 2012 PCE Concentration Between 100 and 1,000 µg/L
May 2012 PCE Concentration Between 10 and 100 µg/L
May 2012 PCE Concentration Less than 10 µg/L
Notes:
1. All locations are approximate.
2. Groundwater extraction from the Farmers Creek stratum began in September 1995 and was suspended on 8 November 2005.
3. Due to figure readability issues, only data since January 2002 are shown on this figure. Please refer to previous sampling reports for data prior to January 2002.
4. The reported analytical data from wells MW-107B and MW-107C for samples collected on 28 October 2004 are suspected to be switched. The shown concentration is as reported by the laboratory.
Erler & Kalinowski, Inc.
PCE Concentrations (µg/L) Detected in Groundwater Samples From Farmers Creek
Chemplex Site First OU
Clinton, Iowa
August 2012
EKI 890052.64
Figure 4

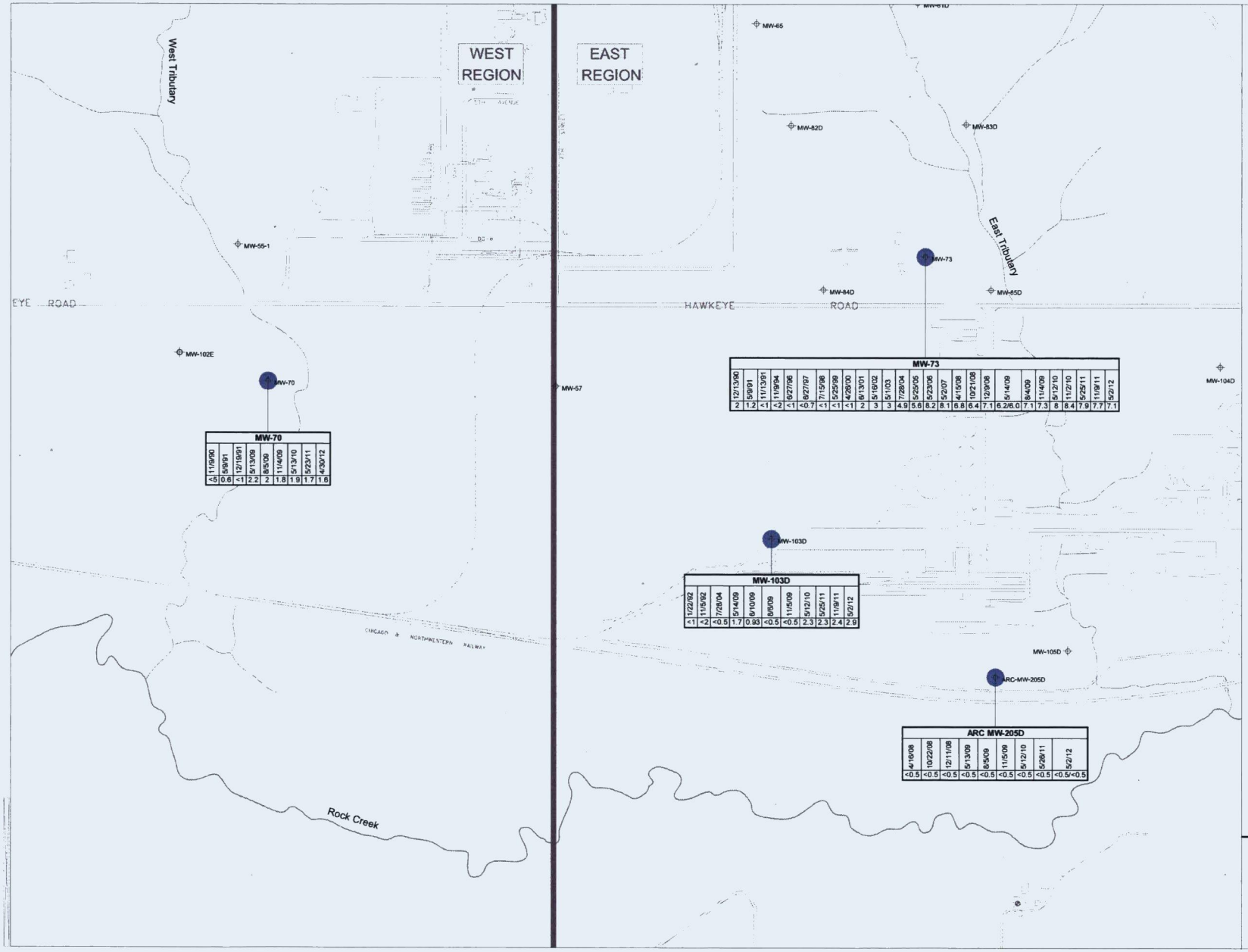


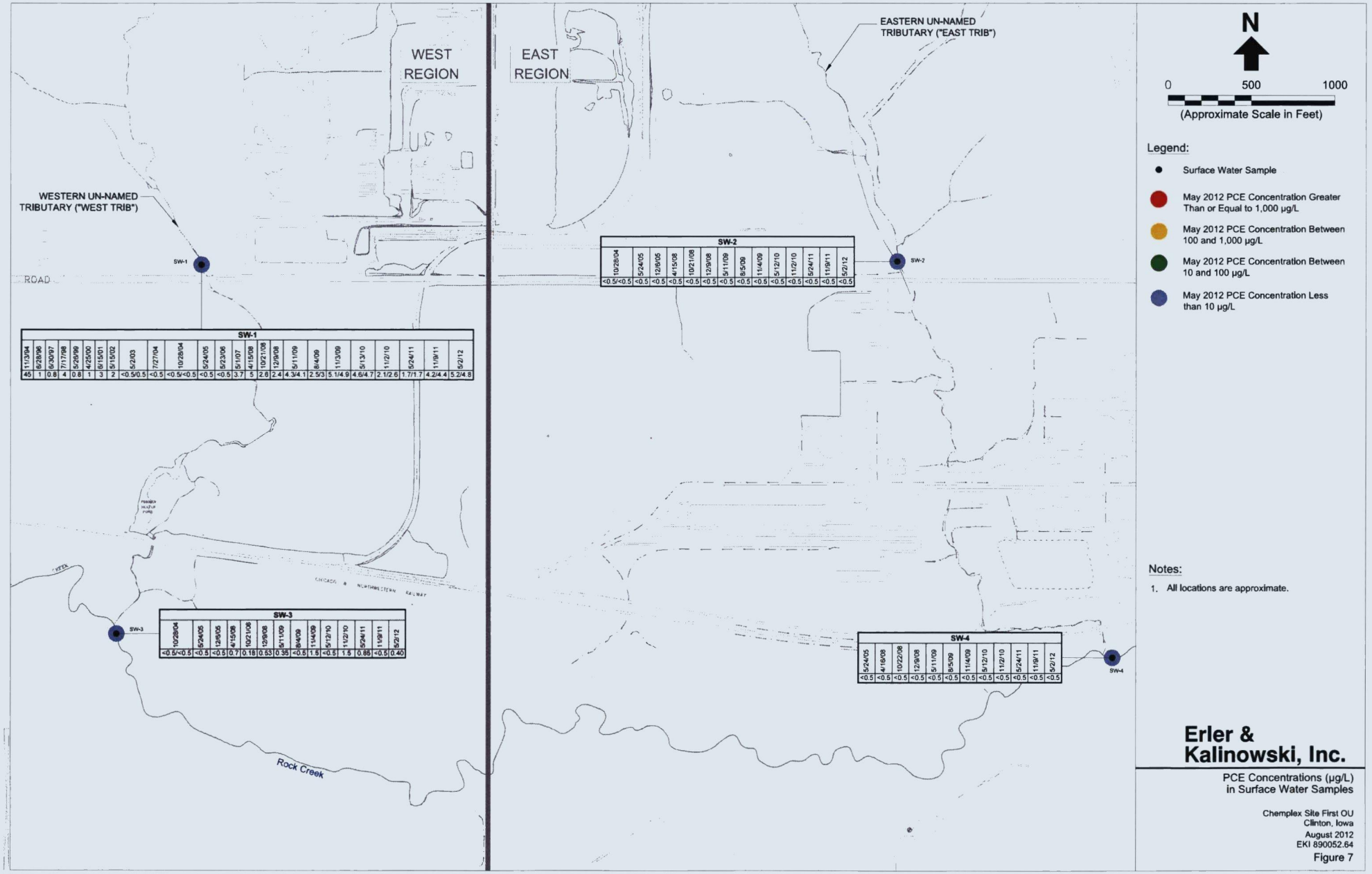
Notes:

1. All locations are approximate.
2. Groundwater extraction from this stratum began on 18 November 1995 and was suspended on 17 March 1999.

Erler & Kalinowski, Inc.

PCE Concentrations (µg/L)
Detected in Groundwater Samples
From Lower Hopkinton
Chemplex Site First OU
Clinton, Iowa
August 2012
EKI 890052.64
Figure 5


WEST REGION
EAST REGION
West Tributary
East Tributary
Rock Creek
HAWKEYE ROAD
CHICAGO & NORTHWESTERN RAILWAY
MW-55-1
MW-65
MW-82D
MW-83D
MW-84D
MW-85D
MW-57
MW-102E
MW-104D
MW-105D
MW-70
MW-73
MW-103D
ARC-MW-205D
MW-70
11/19/90 5/9/91 12/19/91 5/13/09 8/5/09 11/4/09 5/13/10 5/23/11 4/30/12
<5 0.6 <1 2.2 2 1.8 1.9 1.7 1.6
MW-73
12/13/90 5/9/91 11/13/91 11/9/94 6/27/96 6/27/97 7/15/98 5/25/99 4/26/00 5/13/01 5/16/02 5/1/03 7/28/04 5/25/05 5/23/06 5/2/07 4/15/08 10/21/08 12/9/08 5/14/09 8/4/09 11/4/09 5/12/10 11/2/10 5/25/11 11/9/11 5/2/12
2 1.2 <1 <2 <1 <0.7 <1 <1 <1 2 3 3 4.9 5.8 8.2 8.1 6.8 6.4 7.1 6.2/6.0 7.1 7.3 8 8.4 7.9 7.7 7.1
MW-103D
1/22/92 11/5/92 7/28/04 5/14/08 9/10/08 8/5/09 11/5/09 5/12/10 8/25/11 11/9/11 9/2/12
<1 <2 <0.5 1.7 0.93 <0.5 <0.5 2.3 2.3 2.4 2.9
ARC MW-205D
4/16/08 10/22/08 12/11/08 5/13/09 8/5/09 11/5/09 5/12/10 5/29/11 5/2/12
<0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5 <0.5/<0.5
N
0 500 1000
(Approximate Scale in Feet)
Legend:
Monitoring Well
Former Extraction Well (Inactive)
May 2012 PCE Concentration Greater Than or Equal to 1,000 µg/L
May 2012 PCE Concentration Between 100 and 1,000 µg/L
May 2012 PCE Concentration Between 10 and 100 µg/L
May 2012 PCE Concentration Less than 10 µg/L
Notes:
1. All locations are approximate.
2. Groundwater extraction from the overlying Lower Hopkinton Stratum began on 18 November 1995 and was suspended on 17 March 1999.
Erler & Kalinowski, Inc.
PCE Concentrtation (µg/L) Detected in Groundwater Samples From Blanding
Chemplex Site First OU
Clinton, Iowa
August 2012
EKI 890052.64
Figure 6



SW-1

11/3/94	6/28/96	6/30/97	7/17/98	5/26/99	4/25/00	6/15/01	5/15/02	5/2/03	7/27/04	10/28/04	5/24/05	5/23/06	5/1/07	4/15/08	10/21/08	12/9/08	5/11/09	8/4/09	11/3/09	5/13/10	11/2/10	5/24/11	11/9/11	5/2/12
45	1	0.8	4	0.8	1	3	>1	<0.5/0.5	<0.5	<0.5/<0.5	<0.5	<0.5	3.7	5	2.6	2.4	4.3/4.1	2.5/3	5.1/4.9	4.6/4.7	2.1/2.6	1.7/1.7	4.2/4.4	5.2/4.8

SW-2

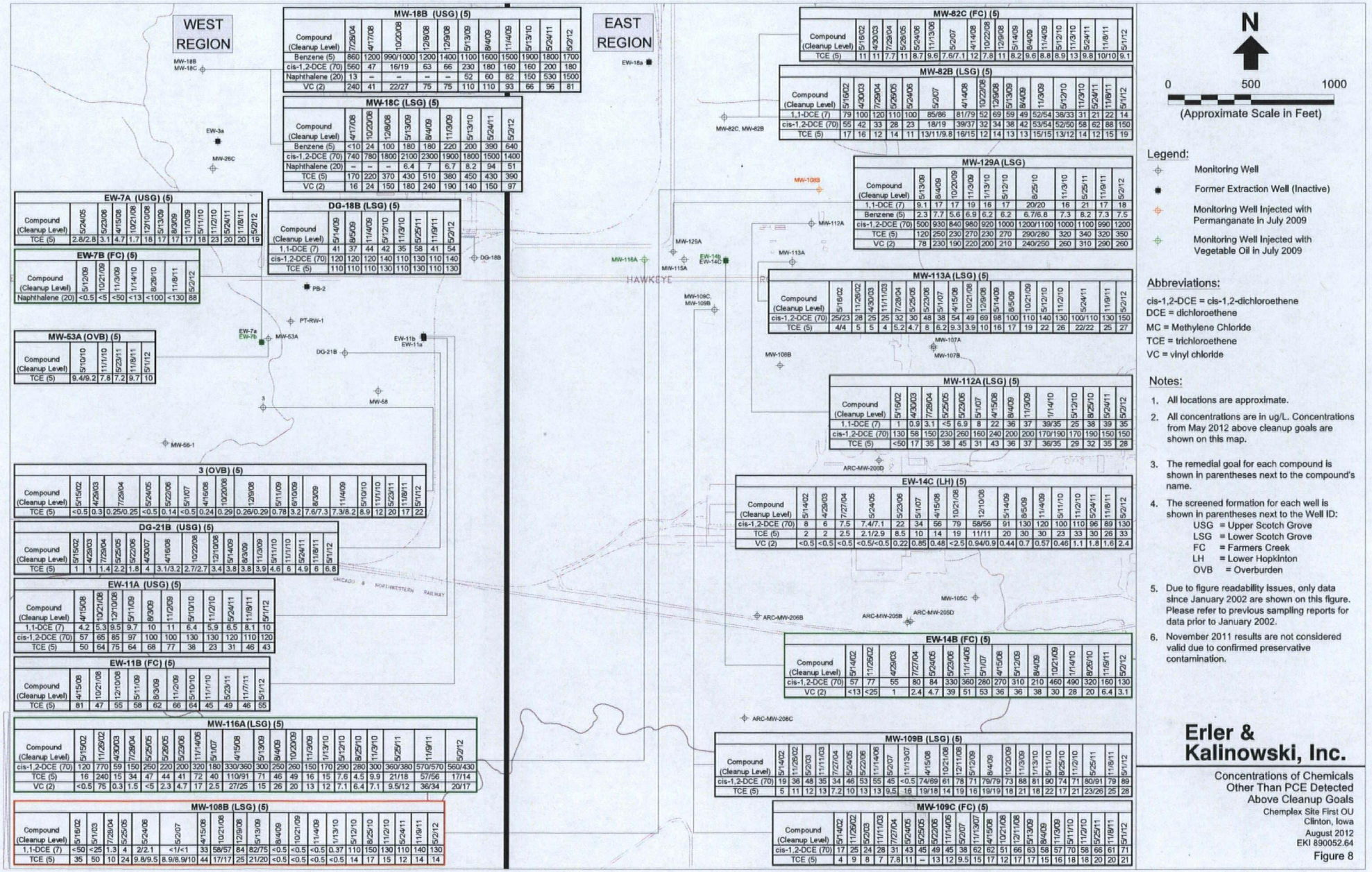
10/28/04	5/24/05	12/8/05	4/15/08	10/21/08	12/9/08	5/11/09	8/5/09	11/4/09	5/12/10	11/2/10	5/24/11	11/9/11	5/2/12
<0.5/<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5

SW-3

10/28/04	5/24/05	12/9/05	4/15/08	10/21/08	12/9/08	5/11/09	8/4/09	11/4/09	5/12/10	11/2/10	5/24/11	11/9/11	5/2/12
<0.5/<0.5	<0.5	<0.5	0.7	0.18	0.63	0.35	<0.5	1.5	<0.5	1.5	0.85	<0.5	0.40

SW-4

5/24/05	4/16/08	10/22/08	12/9/08	5/11/09	8/5/09	11/4/09	5/12/10	11/2/10	5/24/11	11/9/11	5/2/12
<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5



MW-18B (USG) (5)

Compound (Cleanup Level)	7/29/04	4/17/08	10/20/08	12/8/08	12/9/08	5/13/09	8/4/09	11/4/09	5/13/10	5/24/11	5/2/12
Benzene (5)	860	1200	990/1000	1200	1400	1100	1600	1500	1900	1800	1700
cis-1,2-DCE (70)	560	47	16/19	63	66	230	180	160	160	200	180
Naphthalene (20)	13	–	–	–	–	52	60	82	150	530	1500
VC (2)	240	41	22/27	75	75	110	110	93	66	96	81

MW-18C (LSG) (5)

Compound (Cleanup Level)	4/17/08	10/23/08	12/8/08	5/13/09	8/4/09	11/3/09	5/13/10	5/24/11	5/2/12
Benzene (5)	<10	24	100	180	180	220	200	390	640
cis-1,2-DCE (70)	740	780	1800	2100	2300	1900	1800	1500	1400
Naphthalene (20)	–	–	–	6.4	7	6.7	8.2	94	51
TCE (5)	170	220	370	430	510	380	450	430	390
VC (2)	16	24	150	180	240	190	140	150	97

EW-7A (USG) (5)

Compound (Cleanup Level)	5/24/05	5/23/06	4/15/08	10/21/08	12/10/08	5/13/09	8/3/09	11/3/09	5/11/10	11/2/10	5/24/11	11/8/11	5/2/12
TCE (5)	2.8/2.8	3.1	4.7	1.7	18	17	17	17	18	23	20	20	19

EW-7B (FC) (5)

Compound (Cleanup Level)	5/1/2/09	10/21/09	11/3/09	1/14/10	8/26/10	11/8/11	5/2/12
Naphthalene (20)	<0.5	<5	<50	<13	<100	<130	88

DG-18B (LSG) (5)

Compound (Cleanup Level)	5/14/09	8/5/09	11/4/09	5/12/10	11/3/10	8/25/11	11/9/11	5/2/12
1,1-DCE (7)	41	37	44	42	35	58	41	54
cis-1,2-DCE (70)	120	120	120	140	110	130	110	140
TCE (5)	110	110	110	130	110	130	110	130

MW-53A (OVB) (5)

Compound (Cleanup Level)	5/10/10	11/1/10	5/23/11	11/8/11	5/1/12
TCE (5)	9.4/9.2	7.8	7.2	9.7	10

3 (OVB) (5)

Compound (Cleanup Level)	5/15/02	4/29/03	7/29/04	5/24/05	5/22/06	5/1/07	4/16/08	10/20/08	12/9/08	5/11/09	6/10/09	8/3/09	11/4/09	5/10/10	11/1/10	5/23/11	11/8/11	5/1/12
TCE (5)	<0.5	0.3	0.25/0.25	<0.5	0.14	<0.5	0.24	0.29	0.26/0.29	0.78	3.2	7.6/7.3	7.3/8.2	8.9	12	20	17	22

DG-21B (USG) (5)

Compound (Cleanup Level)	5/15/02	4/29/03	7/29/04	5/25/05	5/22/06	4/30/07	4/16/08	10/22/08	12/10/08	5/14/09	9/3/09	11/3/09	5/11/10	11/1/10	5/24/11	11/8/11	5/1/12
TCE (5)	1	1	1.4	2.2	1.8	4	3.1/3.2	2.7/2.7	3.4	3.8	3.8	3.9	4.6	6	4.9	6	6.8

EW-11A (USG) (5)

Compound (Cleanup Level)	4/15/08	10/21/08	12/10/08	5/11/09	8/3/09	11/2/09	5/10/10	11/2/10	5/24/11	11/8/11	5/1/12
1,1-DCE (7)	4.2	5.3	9.5	9.7	10	11	6.4	5.9	6.5	8.1	10
cis-1,2-DCE (70)	57	65	85	97	100	100	130	130	120	110	120
TCE (5)	50	64	75	64	68	77	38	23	31	46	43

EW-11B (FC) (5)

Compound (Cleanup Level)	4/15/08	10/21/08	12/10/08	5/11/09	8/3/09	11/2/09	5/10/10	11/1/10	5/23/11	11/7/11	5/1/12
TCE (5)	81	47	55	58	62	66	64	45	49	46	55

MW-116A (LSG) (5)

Compound (Cleanup Level)	5/15/02	11/26/02	4/30/03	7/28/04	5/25/05	5/26/05	5/23/06	11/14/06	5/1/07	4/15/08	5/13/09	8/4/09	10/20/09	11/3/09	1/13/10	5/12/10	8/25/10	11/3/10	5/25/11	11/9/11	5/2/12
cis-1,2-DCE (70)	120	770	59	150	250	220	200	320	180	330/360	300	250	260	150	170	290	280	300	360/380	570/570	560/430
TCE (5)	16	240	15	34	47	44	41	72	40	110/91	71	46	49	16	15	7.6	4.5	9.9	21/18	57/56	17/14
VC (2)	<0.5	75	0.3	1.5	<5	2.3	4.7	17	2.5	27/25	15	26	20	13	12	7.1	6.4	7.1	9.5/12	36/34	20/17

MW-108B (LSG) (5)

Compound (Cleanup Level)	5/16/02	5/1/03	7/29/04	5/25/05	5/24/06	5/2/07	4/15/08	10/21/08	12/8/08	5/13/09	8/4/09	10/21/09	11/4/09	1/13/10	5/12/10	8/25/10	11/2/10	5/24/11	11/9/11	5/2/12
1,1-DCE (7)	<50	<25	1.3	4	2/2.1	<1/<1	33	58/57	84	82/75	<0.5	<0.5	<0.5	0.37	110	150	130	110	140	130
TCE (5)	35	50	10	24	9.8/9.5	8.9/8.9/10	44	17/17	25	21/20	<0.5	<0.5	<0.5	<0.5	14	17	15	12	14	14

MW-82C (FC) (5)

Compound (Cleanup Level)	5/16/02	4/30/03	7/29/04	5/26/05	5/24/06	11/13/06	5/2/07	4/14/08	10/22/08	12/9/08	5/14/09	8/4/09	11/4/09	5/12/10	11/3/10	5/24/11	11/8/11	5/1/12
TCE (5)	11	11	7.7	11	8.7	9.6	7.6/7.1	12	7.8	11	8.2	9.6	8.8	8.9	13	9.8	10/10	9.1

MW-82B (LSG) (5)

Compound (Cleanup Level)	5/16/02	4/30/03	7/29/04	5/26/05	5/24/06	5/2/07	4/14/08	10/22/08	12/9/08	5/13/09	8/4/09	11/3/09	5/12/10	11/3/10	5/24/11	11/8/11	5/1/12
1,1-DCE (7)	79	100	120	110	100	85/86	81/79	52	69	59	49	52/54	38/33	31	21	22	14
cis-1,2-DCE (70)	55	42	33	28	23	18/19	39/37	32	34	38	42	53/54	52/50	58	62	88	150
TCE (5)	17	16	12	14	11	13/11/9.8	16/15	12	14	13	13	15/15	13/12	14	12	15	19

MW-129A (LSG)

Compound (Cleanup Level)	5/13/09	8/4/09	10/20/09	11/3/09	1/13/10	5/12/10	8/25/10	11/3/10	5/25/11	11/9/11	5/2/12
1,1-DCE (7)	9.1	17	17	19	16	17	20/20	16	21	17	18
Benzene (5)	2.3	7.7	5.6	6.9	6.2	6.2	6.7/6.8	7.3	8.2	7.3	7.5
cis-1,2-DCE (70)	500	930	840	980	920	1000	1200/1100	1000	1100	990	1200
TCE (5)	120	250	230	270	230	270	290/280	320	340	320	350
VC (2)	78	230	190	220	200	210	240/250	260	310	290	260

MW-113A (LSG) (5)

Compound (Cleanup Level)	5/16/02	11/26/02	4/30/03	11/11/03	7/28/04	5/25/05	5/23/06	5/1/07	4/15/08	10/21/08	12/9/08	5/14/09	8/5/09	10/21/09	5/12/10	11/2/10	5/24/11	11/9/11	5/2/12
cis-1,2-DCE (70)	25/23	28	25	25	32	30	48	38	54	49	69	98	100	110	140	130	100/110	130	150
TCE (5)	4/4	5	5	4	5.2	4.7	8	6.2	9.3	3.9	10	16	17	19	22	26	22/22	25	27

MW-112A (LSG) (5)

Compound (Cleanup Level)	5/16/02	4/30/03	7/28/04	5/25/05	5/23/06	5/1/07	4/15/08	8/4/09	11/3/09	1/14/10	5/12/10	8/25/10	5/24/11	5/2/12
1,1-DCE (7)	1	0.9	3.1	<5	6.9	8	22	36	37	39/35	25	38	39	35
cis-1,2-DCE (70)	130	58	150	230	260	160	240	200	200	170/190	170	190	150	150
TCE (5)	<50	17	35	38	45	31	43	36	37	36/35	29	32	35	28

EW-14C (LH) (5)

Compound (Cleanup Level)	5/14/02	4/29/03	7/27/04	5/24/05	5/23/06	5/1/07	4/15/08	10/21/08	12/10/08	5/14/09	8/5/09	11/4/09	5/11/10	11/2/10	5/24/11	11/8/11	5/2/12
cis-1,2-DCE (70)	8	6	7.5	7.4/7.1	22	34	56	79	58/56	91	130	120	100	110	96	89	130
TCE (5)	2	2	2.5	2.1/2.9	8.5	10	14	19	11/11	20	30	30	23	33	30	26	33
VC (2)	<0.5	<0.5	<0.5	<0.5/<0.5	0.22	0.85	0.48	<2.5	0.94/0.9	0.44	0.7	0.57	0.46	1.1	1.8	1.6	2.4

EW-14B (FC) (5)

Compound (Cleanup Level)	5/14/02	11/26/02	4/29/03	7/27/04	5/24/05	5/23/06	11/14/06	5/1/07	4/15/08	5/12/09	8/4/09	10/21/09	1/14/10	8/25/10	11/9/11	5/2/12
cis-1,2-DCE (70)	57	77	55	80	84	330	360	280	270	310	210	460	490	320	160	130
VC (2)	<13	<25	1	2.4	4.7	39	51	53	36	36	38	30	28	20	6.4	3.1

MW-109B (LSG) (5)

Compound (Cleanup Level)	5/14/02	11/26/02	5/2/03	11/11/03	7/27/04	5/24/05	5/22/06	11/14/06	5/2/07	11/13/07	4/15/08	10/21/08	12/11/08	5/12/09	8/4/09	10/20/09	11/3/09	1/13/10	5/11/10	8/25/10	11/2/10	5/25/11	11/8/11	5/1/12
cis-1,2-DCE (70)	19	36	48	35	34	46	53	55	45	<0.5	74/69	61	78	71	79/79	73	88	81	90	74	71	80/91	79	89
TCE (5)	5	11	12	13	7.2	10	13	13	9.5	16	19/18	14	19	16	19/19	18	21	18	22	17	21	23/26	25	28

MW-109C (FC) (5)

Compound (Cleanup Level)	5/14/02	11/26/02	5/2/03	11/11/03	7/27/04	5/24/05	5/25/05	5/22/06	11/14/06	5/2/07	11/13/07	4/15/08	10/21/08	12/11/08	5/12/09	8/4/09	10/20/09	11/3/09	1/13/10	5/11/10	8/25/10	11/2/10	5/25/11	11/8/11	5/1/12
cis-1,2-DCE (70)	17	25	24	28	31	43	45	49	45	38	62	62	51	66	63	58	57	70	56	66	61	71		
TCE (5)	4	9	8	7	7.8	11	–	13	12	9.5	15	17	12	17	17	15	16	18	18	20	20	21		

Legend:

- Monitoring Well
- Former Extraction Well (Inactive)
- Monitoring Well Injected with Permanganate in July 2009
- Monitoring Well Injected with Vegetable Oil in July 2009

Abbreviations:

cis-1,2-DCE = cis-1,2-dichloroethene
DCE = dichloroethene
MC = Methylene Chloride
TCE = trichloroethene
VC = vinyl chloride

Notes:

1. All locations are approximate.
2. All concentrations are in ug/L. Concentrations from May 2012 above cleanup goals are shown on this map.
3. The remedial goal for each compound is shown in parentheses next to the compound's name.
4. The screened formation for each well is shown in parentheses next to the Well ID:
   - USG = Upper Scotch Grove
   - LSG = Lower Scotch Grove
   - FC = Farmers Creek
   - LH = Lower Hopkinton
   - OVB = Overburden
5. Due to figure readability issues, only data since January 2002 are shown on this figure. Please refer to previous sampling reports for data prior to January 2002.
6. November 2011 results are not considered valid due to confirmed preservative contamination.

Erler & Kalinowski, Inc.

Concentrations of Chemicals Other Than PCE Detected Above Cleanup Goals
Chemplex Site First OU
Clinton, Iowa
August 2012
EKI 890052.64
Figure 8

Appendix C

{In Archive} ROD Amendment for the Chemplex site
Lundberg, Cal [DNR]
to:
Nancy Swyers
06/21/2012 01:23 PM
Cc:
"Drustrup, Bob [DNR]", "Tormey, Brian [DNR]"
Hide Details
From: "Lundberg, Cal [DNR]" <Cal.Lundberg@dnr.iowa.gov>

To: Nancy Swyers/SUPR/R7/USEPA/US@EPA

Cc: "Drustrup, Bob [DNR]" <Bob.Drustrup@dnr.iowa.gov>, "Tormey, Brian [DNR]" <Brian.Tormey@dnr.iowa.gov>

History: This message has been forwarded.
Archive: This message is being viewed in an archive.

IDNR supports the ROD Amendment recently proposed for the Chemplex site.

Cal Lundberg, Ph.D., Supervisor
Contaminated Sites Section
Iowa Dep't. of Natural Resources
515-281-7040
mailto:cal.lundberg@dnr.iowa.gov